McGRAW-HILL DIGEST

NFRARED IN INDUSTRY—Report to Management.....53

SPECIAL FEATURES

Var Research Reconverted..13
levision Business Booms..15
dioactivity in Processing..16
st Production, Handling...19
dvanced Power Plant Design 22
nalyzing Materials Handling 27
tter Paper Mill Methods..30

AVIATION

cords Flight Data.....38
ate-Gyro Auto Pilot.....47
uild-It-Yourself Plane 52
lso: 13, 18, 25, 29, 32, 35, 43, 51

CHEMISTRY

heap Fertilizer 24
ils from Pine Stumps.....36
Vatch Nuclear Progress.....47
lso: 10, 13, 16, 31, 34, 37, 40, 52

CONSTRUCTION

oil-Cement Canal Lining....18
Welded Highway Deck.....48
ast Earth Moving.....49
lso: 9, 15, 31, 32, 39, 42, 45, 52

ELECTRICITY, POWER

ood Drafting-Room Light...14
oiler Feed-Pump Drive.....33
emoves Boiler Scale.....38
lso: 13, 18, 21, 22, 24, 42, 44, 51

More Efficient Tin Smelting..34
New Methods in Construction 39
Buick's Torque Converter...46
New Turbojet Engine Designed 51
Business Trends 9
Technical Shorts 32
New Products 42

ELECTRONICS, RADIO

Solve Television Problems....35
Machine-Made Radio 40
Electronic Controller 50
Also: 15, 19, 23, 25, 29, 36, 41, 52

FACTORY METHODS

Job Budget Plan Saves.....20
Incentive Unlimited 24
Selecting Salesmen 37
Also: 9, 19, 26, 27, 28, 35, 40, 43

FOOD PROCESSING

Protects Hygroscopic Food...24
Use Mother Tuna Ships.....25
Affect Cracker Quality.....37
Also: 10, 29, 32, 33, 43, 44, 45, 49

MECHANICAL DESIGN

Fluid Primer for Pump.....32
Air-Cushion Clutch 44
Design for Shock 47
Also: 13, 27, 31, 32, 33, 42, 43, 44

METALWORKING

Surface Broaching Trend....26
Submerge-Melt Welding 35
Tough Alloy Shaped.....38
Align Honing Saves Time....47
Also: 9, 13, 20, 25, 29, 32, 42, 45

MINING

Pipe Protects Mine Cable....18
Barite Mine Goes Modern....21
Loader Works Thin Seams....41
Also: 10, 32, 33, 34, 37, 42, 43, 45

TEXTILES

96-Feed Circular Knitter.....20
Spins, Packages Rayon.....26
Makes Bonded-Web Cloth...51
Also: 10, 13, 21, 33, 42, 43, 44, 48

TRANSPORTATION

120-Passenger Tour Bus.....28
New For Your Car.....41
Efficient Track Puller.....52
Also: 9, 19, 21, 24, 25, 36, 40, 46

170 ITEMS IN THIS ISSUE

Esso storage tanks are being constructed with capacities from 5,000 to over 100,000 barrels apiece.

Storehouse for Tomorrow

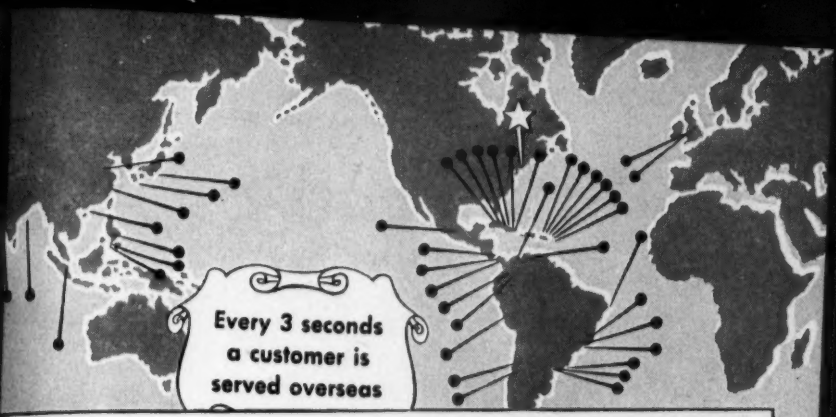
The world's demand for petroleum has reached an all-time high — and is still increasing! Today the need for petroleum is even greater than during the peak war year of 1945. Hence the huge construction program which we are now pushing to completion. New storage facilities are being built to expedite the flow of petroleum from well to refinery, and from there to place of final use.

New pipelines, refineries and tankers are also urgently needed — and are being provided as fast as possible. They will all help to bring more petroleum to more people. For where petroleum goes, comfort and convenience follow.

Petroleum helps to build a better life.

A SIGN OF QUALITY — Esso — A SYMBOL OF SERVICE

STANDARD OIL COMPA
(New Jersey)



Doing business in the United States?

Facilitate your commercial transactions in the United States—or anywhere else in the world—through the services of The National City Bank of New York. National City maintains sixty-five branches in Greater New York, correspondent relationships with banks in every state in the Union, and 48 branches overseas. Thus you are assured of complete, dependable, experienced international banking services in every commercially important area of the world. For full information, write to the nearest National City branch listed below, or to Head Office, 55 Wall Street, New York City.

THE NATIONAL CITY BANK OF NEW YORK

First in World Wide Banking

ARGENTINA
Buenos Aires
Flores
Plaza Once
Rosario

BRAZIL
Rio de Janeiro
Recife
(Pernambuco)
Santos
São Paulo

CANAL ZONE
Balboa
Cristobal

CHILE
Santiago
Valparaiso

CHINA
Shanghai
Tientsin

COLOMBIA
Bogota
Barranquilla
Medellin

CUBA
Havana
Cuatro Caminos
Galiano
La Lonja
Caibarien
Cardenas
Manzanillo
Matanzas
Santiago

ENGLAND
London
117, Old Broad St.
11, Waterloo Place

HONG KONG

INDIA
Bombay
Calcutta

JAPAN
Tokyo
Osaka

MEXICO
Mexico City

PERU
Lima

PHILIPPINES
Manila
Cebu
Clark Field

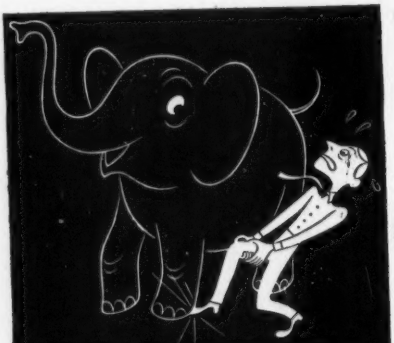
PUERTO RICO
San Juan
Arecibo
Bayamon
Caguas
Mayaguez
Ponce

REPUBLIC OF PANAMA
Panama

SINGAPORE

URUGUAY
Montevideo

VENEZUELA
Caracas



GET A HOIST!

A YALE HOIST

Are you pinned down by mammoth production costs that muscles can't budge? Then get out from under with a Yale Spur-Geared Hand Hoist.

It will lift more tons per day, more efficiently at less cost per ton than a crew of muscle men. Capacities from ¼ to 40 tons. See your local Yale representative, or send for catalog—SG-D. The Yale & Towne Mfg. Co., 4509 Tacony St., Phila. 24, Pa.

TOOLS THAT KEEP INDUSTRY "ON THE MOVE" MADE BY... **YALE**

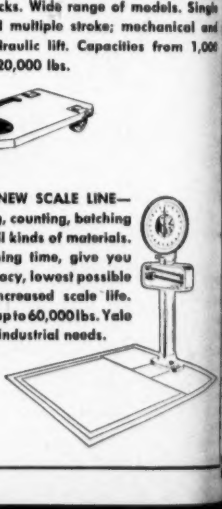
SCALES
• HAND AND ELECTRIC HOISTS
• HAND LIFT AND ELECTRIC TRUCKS

"ON THE MOVE" WITH YALE

NEWEST ADDITION to the Yale line is the Worksaver. It travels and lifts by electric power. Has 2 forward and reverse speeds. 7 styles, with capacities from 1,000 to 6,000 lbs.

"MONEY SAVING SPACE SAVER" ...That's what users call the Yale High Lift Fork Truck. Piles palletized loads ceiling high. Scores of other standard models to fit your individual requirements. Capacities up to 60,000 lbs.

HANDLING MORE MATERIAL with less effort is routine for Yale Hand Lift Trucks. Wide range of models. Single and multiple stroke; mechanical and hydraulic lift. Capacities from 1,000 to 20,000 lbs.



YALE OFFERS NEW SCALE LINE—for the weighing, counting, batching and testing of all kinds of materials. They cut weighing time, give you prolonged accuracy, lowest possible maintenance, increased scale life. With capacities up to 60,000 lbs. Yale Scales meet all industrial needs.

McGRAW-HILL DIGEST—Source For More Comprehensive Information

Under each item in the McGRAW-HILL DIGEST appears the original source of information. For example, "Electronics, D, 176", indicates that the complete article can be found on page 176 of the December issue of ELECTRONICS. This provides an invaluable reference source wherever McGraw-Hill Publications are available.

However, when you as a subscriber are especially interested in an article in the McGRAW-HILL DIGEST, and the source publication is not readily available—a request to our editors, or to our London office, will bring you tear sheets of the original article as long as they are available, and at no extra cost to you.

Whenever you are interested in having additional information about any of the equipment described in the New Products section, your inquiry will be acknowledged, and then will be passed on to the manufacturer with the request that complete descriptive literature be sent to you.

Any questions not answerable in accordance with the methods outlined above will be given special attention by McGRAW-HILL DIGEST editors, in order to locate the information you want.

We believe you will agree that these services, plus the comprehensiveness of the information it offers you each month, can make the McGRAW-HILL DIGEST your greatest single source of technical and business information.

How to Subscribe to the McGRAW-HILL DIGEST

If you are not already a subscriber to the McGRAW-HILL DIGEST, you will be interested to know that the leading subscription agencies in most countries are now in a position to transmit your subscription instructions and remittance for you. Or, you can send your subscription to McGraw-Hill International Corp., 330 West 42nd Street, New York 18, N. Y., U. S. A.—or McGraw-Hill International Corp., Aldwych House, Aldwych, London WC2, England.

COPYRIGHT, 1948, BY McGRAW-HILL INTERNATIONAL CORP.

DIGESTS FROM THE FOLLOWING PUBLICATIONS:

AMERICAN MACHINIST • AIR TRANSPORT • AVIATION WEEK • BUS TRANSPORTATION • BUSINESS WEEK • CHEMICAL ENGINEERING • COAL AGE • CONSTRUCTION METHODS • ELECTRICAL CONSTRUCTION & MAINTENANCE • ELECTRICAL MERCHANDISING • ELECTRICAL WEST • ELECTRICAL WHOLESALING • ELECTRICAL WORLD • ELECTRONICS • ENGINEERING & MINING JOURNAL • ENGINEERING NEWS-RECORD • FACTORY • FOOD INDUSTRIES • MILL SUPPLIES • NUCLEONICS • OPERATING ENGINEER • PHARMACY INTERNATIONAL • POWER • PRODUCT ENGINEERING • SCIENCE ILLUSTRATED • TEXTILE WORLD • THE AMERICAN AUTOMOBILE • WELDING ENGINEER

World News Offices: London, Paris, Berlin, Moscow, Tokyo, Melbourne, Bombay, Buenos Aires, Rio de Janeiro, Stockholm, Mexico City

VOLUME 3 • NUMBER 3

MARCH, 1948

JOHN F. CHAPMAN
Publisher

F. K. LAWLER, *Editor*

J. H. McKEE, Jr.
Assistant Editor

SHELBY McMILLION
Business Manager

McGraw-Hill Digest is published monthly by McGraw-Hill International Corp. for circulation in all countries except the United States and Canada. Publication and executive offices, 330 W. 42nd St., New York 18, N. Y., U.S.A. James H. McGraw, Jr., President; John Abbink, Chairman of the Board; J. L. Gilbert, Senior Vice-President; J. F. Chapman, Vice-President; George Quisenberry, Vice-President; Paul West, Vice-President; Curtis W. McGraw, Treasurer; J. A. Gerardi, Secretary; J. C. Stark, Assistant to President; K. P. Bliss, Vice-President and Director of Advertising; J. E. Blackburn, Director of Circulation. *Subscriptions may be ordered through Director of Circulation, through local book dealer, or McGraw-Hill's London Office, Aldwych House, London, W. C. 2.* Subscription rates: $5 for 1 year, $8 for 2 years, or $10 for 3 years; single copy, 50¢ (U. S. currency or equivalent). Entered as second-class matter December 17, 1947, at the post office at New York, New York, under the Act of March 3, 1879.

Trade Must Flow

TWO WAYS

says Canada

And, in fact, Canadian trade does flow two ways. Total exports and total imports are closely balanced in value.

To sellers abroad, Canada affords a large and varied market for imported goods.

To buyers abroad, Canada offers a broad range of both primary and manufactured products.

If you wish to buy or sell in Canada, consult your nearest Canadian Trade Representative. He is at your service in any of the following countries:

ARGENTINA • AUSTRALIA • BELGIAN CONGO • BELGIUM • BRAZIL • CHILE • CHINA • COLOMBIA • CUBA • EGYPT • FRANCE • GREECE • GUATEMALA • HONG KONG • INDIA • IRELAND • ITALY • JAMAICA • MALAYAN UNION • MEXICO • NETHERLANDS • NEWFOUNDLAND • NEW ZEALAND • NORWAY • PAKISTAN • PERU • PORTUGAL • SOUTH AFRICA • SWEDEN • TRINIDAD • UNITED KINGDOM • UNITED STATES • VENEZUELA

THE FOREIGN TRADE SERVICE

DEPARTMENT OF TRADE AND COMMERCE

OTTAWA **CANADA**

ATTEND THE

CANADIAN INTERNATIONAL TRADE FAIR

Toronto, Canada, May 31-June 12, 1948

See and examine the trade offerings of the world—on display in Canada in 1948. Compare the finest goods of many nations—of many industries. Plan now to attend the Canadian International Trade Fair, or to send a representative. Get full details, including information on travel and accommodation, from your nearest Canadian Trade Representative.

How Bliss Hydraulic and Mechanical Presses Combine to Triple Production at Hotpoint, Inc.

Three special Bliss 500-ton single-action hydraulic presses and two Bliss straight-side mechanical presses perform all press operations required to produce the new, nickel alloy Calrod units for Hotpoint electric ranges. Here's how:

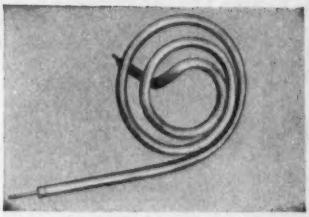
Six-station Bliss dial feed on each hydraulic press allows loading, pressing and unloading—at one time.

Terminal forming and flattening are performed simultaneously at one stroke; press output is 350 pieces per hour from each unit.

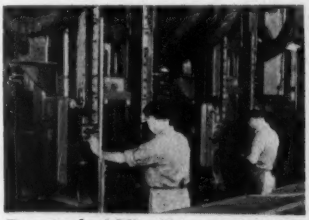
Mechanical presses do final terminal forming—200 pieces per hour on each press.

This combination of Bliss hydraulic and mechanical presses has tripled Hotpoint's production over previous equipment...another example of "dividends" on another busy production line.

Only at Bliss can you get the *combined* experience in the manufacture and use of both mechanical and hydraulic presses. Bliss engineers will be glad to help with your pressed-metal production. Put your problem before them.



Stepped design of Calrod unit presented a difficult die problem.



Two standard Bliss 95-ton straight-side presses do final terminal forming.

E. W. BLISS COMPANY, DETROIT 2, MICH. U.S.A.

Mechanical and Hydraulic Presses, Rolling Mills, Can and Container Machinery

WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Michigan; Englewood, New Jersey; Derby, England; St. Ouen sur Seine, France.

Slide of press cannot descend if Calrod unit is not properly in die.

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY

STAY AHEAD WITH Bliss

To Serve YOUR *Needs in World-Business*

McGraw-Hill International offers you up-to-date information on new products, methods, standards and data on the latest developments of interest to executives in business and industry.

This is the kind of information that will help you increase the efficiency and profit of your business or profession.

You can obtain it in these McGraw-Hill International specialized magazines:

McGRAW-HILL DIGEST for executives, engineers, and technologists. Published monthly, it includes more than 150 items about new developments in business, industry, engineering and science, digested from 28 McGraw-Hill magazines and from McGraw-Hill books.

THE AMERICAN AUTOMOBILE (**Overseas Edition**) and **EL AUTOMOVIL AMERICANO** are published monthly in English and Spanish for the Automotive Trade.

INGENIERIA INTERNACIONAL INDUSTRIA published monthly in Spanish for the plant executives, engineers and importers of industrial equipment throughout Latin America.

INGENIERIA INTERNACIONAL CONSTRUCCION published monthly in Spanish for contractors, engineers, government officials, importers and buyers of construction equipment in Latin America.

PHARMACY INTERNATIONAL and **EL FARMACEUTICO** published monthly in English and Spanish for the buyers of drugs, pharmaceuticals, cosmetics, toiletries and allied products.

ANNUAL BUYERS GUIDES include data on U. S. manufacturers and their products. The Guides provide information on a source of supply for importers, wholesalers and other buyers overseas. Issued in separate English and Spanish editions for the Automotive Trade, and in Spanish editions for industrial machinery and construction equipment.

McGRAW-HILL PUBLISHING CO., LTD. (LONDON), distributes McGraw-Hill business, technical and trade books, and publishes THE MACHINIST, a weekly magazine devoted to the metal-working industry.

McGRAW-HILL WORLD NEWS provides fast coverage of foreign news pertinent to each field covered by McGraw-Hill magazines. Correspondents and traveling editors operating out of more than 52 of the world's largest cities are a constant source of articles and information which help you share in today's new business opportunities.

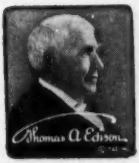
McGRAW-HILL INTERNATIONAL CORPORATION

McGraw-Hill Building, 330 West 42nd Street, New York 18, N. Y., U.S.A.

Headquarters for World-Wide Business and Industrial Information.

POWER FOR TRUCKS THAT MUST WORK—

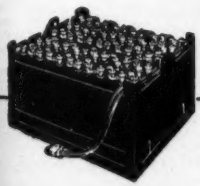
24 hours a day... EVERY DAY!



EDISON

Nickel • Iron • Alkaline

STORAGE BATTERIES

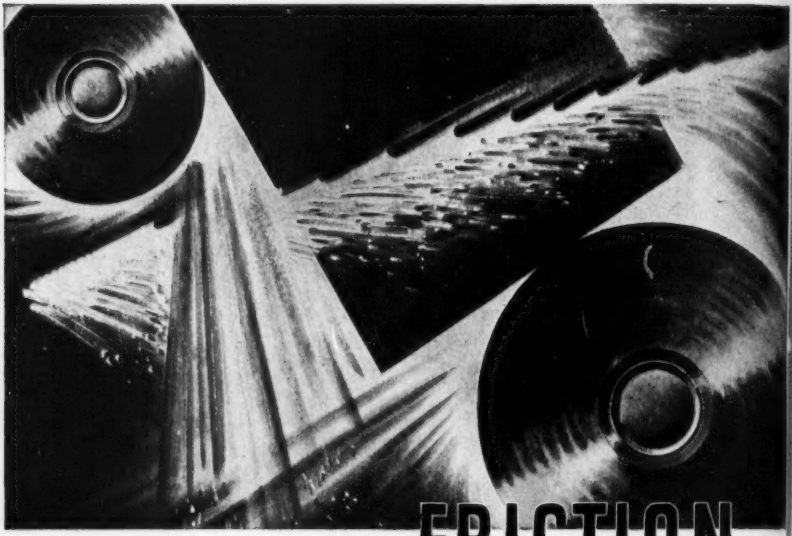


IN INDUSTRIAL TRUCKS, EDISON NICKEL-IRON-ALKALINE BATTERIES GIVE YOU THESE IMPORTANT ADVANTAGES

They are **durable mechanically**; they can be **charged rapidly**; they **withstand temperature extremes**; they are **foolproof electrically**; they can **stand idle indefinitely** without injury; they are **simple and easy to maintain.**

THOMAS A. EDISON, INC.—INTERNATIONAL DIVISION
70 Pine Street, New York 5, N. Y. Cable Address: Zymotic

Friction! Always present wherever there are moving parts; a constant source of wastage and expense. Science is waging a war against friction that is saving millions of dollars a year for industry and transportation.



TO HELP YOU FIGHT FRICTION (AND ITS HEAVY COSTS)

Wherever there is machinery, there is friction, wearing away, causing waste, costing money!

N. B. M. Bronze Bearings and N. B. M. Babbitt Metals can help reduce frictional wear. These Brake Shoe specialties have been developed over years of constant scientific research plus wide experience in all kinds of industry and transportation. Bearings of both standard and special types developed to meet particular conditions are produced in endless variety.

Also available are N. B. M. "Tiger" Bronze Cored and Solid Bronze Bars. They are strong, tough and anti-frictional. They have no hard spots, dirt or scale. You can rely on them to be of sound, dense uniform structure and uniform lead distribution.

The name of the nearest Brake Shoe distributor will be gladly sent on request.

BRAKE SHOE COMPANY PRODUCTS

- ***WEAR-RESISTANT PARTS***—Castings of Manganese and Alloy Steels, Copper, Brass, Bronze, Bearing and Friction Materials. Drop and Upset Steel Forgings.
- ***INDUSTRIAL SPECIALTIES***—Sugar Mill Bearings, Material Handling Pumps, Dredging Equipment, Crusher Parts, Power Shovel Dippers, Manganese and Hard Surfacing Welding Rods, Babbitt Metals.
- ***RAILROAD SPECIALTIES***—Brass, Bronze and Iron Castings, Bearings, Frogs, Switches, Switch Stands, Rail Lubricators, Brake Shoes, Chilled Car Wheels.
- ***AUTOMOTIVE SPECIALTIES***—Brake Lining, Clutch Facings, Air Compressors, Spray Painting Equipment, Babbitt Metals.

AMERICAN BRAKE SHOE COMPANY

Export Division: **230 Park Avenue, New York 17, N. Y., U. S. A.**
Cable Address: **Brakeshoe**

60 PLANTS SERVING INDUSTRY AND TRANSPORTATION AROUND THE WORLD

AMERICAN Brake Shoe COMPANY

BUSINESS TRENDS

Production capacity in the United States will continue to expand at a high rate this year. Capital expenditures for plant and equipment will be only 8% lower than in 1947, a McGraw-Hill survey indicates.

When postwar expansion is complete, capacities of various industries will be greater than in 1939 by these amounts: All manufacturing, 52%; food, 52%; textiles, 49%; chemicals, 56%; petroleum, 52%; metals, 43%; machinery, 63%; electrical machinery, 63%; automobiles, 67%. These important boosts in capacity will help the U. S. to meet world requirements.

Fractional-hp. motor production in the United States has finally reached the stage where some sellers are soliciting new business. This comes as a pleasant surprise.

Backlog of about $750 million in heavy production equipment is reported by General Electric Co. This is 25% above a year ago in dollar volume, perhaps is up 10% in physical volume. Reflected in this situation is the big expansion program of the utility industry.

Production and consumption of chemicals in the United States, which earlier appeared to have leveled off, started on a new upward course in the last quarter of 1947. This has carried into the present months with the apparent certainty that activities in the first three months of this year will be of record-breaking proportions. Apparent current rate of operations is about 5% above a year ago.

Car and truck manufacturers in the United States and Canada expect to set a new all-time production record this year, surpassing the 5,621,045 assemblies of 1929. They will do this, that is, if there is some easing of the steel situation from increased flat-rolled capacity.

U. S. auto makers are expanding plants. Ford has a new $7 million assembly plant. Buick has completed a huge reconstruction and expansion program. Kaiser-Frazer is responsible for a $2 million expansion at Kaiser-Fleetwings, Inc.

United States imports at beginning of 1948 were expected by Tariff Commission to be somewhat higher than the $460 million monthly average in 1947. Substantial quantities of merchandise were held in bonded warehouses in U. S. pending turn of year when lower tariff rates went into effect. Two factors still restricting U. S. imports are inability of rest of world to produce and continued over-valuation of foreign currencies in terms of the dollar. But the trend is in the right direction.

International trade will be stimulated by the Canadian International Fair, to open at Toronto on May 31 of this year, and by two international fairs planned for the United States in 1949. One of the U. S. fairs will be in Cleveland, June 16-26, the other in New York in August. The aim is to promote imports, not just exports.

Russia's currency reform isn't working out as expected, according to reports reaching U. S. State Dept. Effects passed very fast, and goods again are moving into the black market. Russians are still standing in line—only this time without

coupons. There's some talk of speeding demobilization to get more men back to farm and factory to produce sorely needed food and manufactured products.

British chemical makers are receiving more coal and raw materials, especially for export work, but further substantial output gains depend upon new plants being brought into operation. And further slowing of factory construction must be anticipated. The oil refining industry, however, has been granted preferential treatment for a vast expansion scheme. A total of £95,000,000 is to be spent on the erection of refinery capacity, sufficient to handle 20,000,000 long tons of crude oil a year.

Ruhr coal production reached 280,000 tons per day at the end of November, approaching the 300,000-ton daily goal set for December, 1947. A shortage of mine props, caused by lack of transportation, is hindering operations in this all-important industry.

Revival of Japanese textile industry to mid-1930 level will take 10 years. The industry has been damaged by war, has little coal, needs pig iron and steel for expansion, needs raw materials—hard to get in dollar-short economy. The textile industry will contribute a foreign trade balance of about $400,000,000 to expenditure on foods abroad.

Spain's exports last year are estimated to have dropped by half. Prices are rising sharply, and the peseta has become progressively weaker. There has been some pressure there for devaluation; also for inclusion of the country in the Marshall Plan. Spain likely will benefit from the Plan in any case, as it should help to revive agricultural exports to the continent and permit Spain to import other things.

India has attained self-sufficiency in copper and brass alloys, rods and bars, and soon will be able to meet her requirements for sheet and strips. The self-sufficiency, however, is limited to semi-manufactures, since almost all of the virgin metals still must be imported.

Iran has appointed a six-man commission to develop a 5-yr. plan for expansion of its small arms factories and for manufacture of commercial products. Army plants would supply 40% of Iranian army's needs, remainder of output going to neighboring states, possibly Arab states. Another country joins the ranks of those planning for a better industrial future, and stronger self-defense.

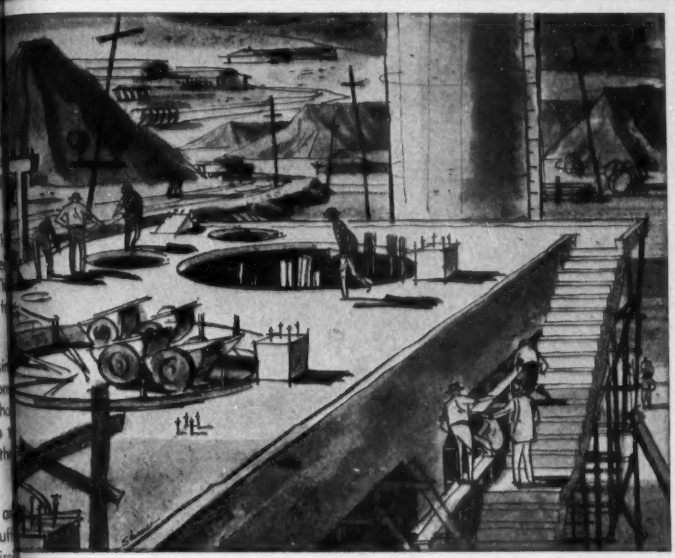
Exchange of tools for goods is involved in a plan being worked out by a group of British machine tool builders. The purpose is to boost foreign sales to conform to the government's request. Development of the plan, now being tried on a small scale, will be interesting to watch.

Italy is the only country in the world where prices are going down, not up. A unique experiment in deflation is working. Between September, 1947, and the year's end, wholesale prices declined 20%, retail prices 7%. Individual declines ranging from 10 to 50% took place among several key food items, such as pork, beef, sugar, wine, and olive oil. Economists have one fear—that the price drop may get out of hand, forcing shutdowns and loss of jobs.

Items on these pages come from McGraw-Hill magazines and news services.

ALLIS-CHALMERS

WORLD'S LARGEST LINE OF MAJOR INDUSTRIAL EQUIPMENT



Forming a Pattern of Industrial Progress

HERE in a reinforced concrete building is good living in-the-making—through steady advances in industry!

Behind scenes like this—helping speed all types of construction, build mills and factories that mean better homes, clothes and conveniences for all—are many ingenious Allis-Chalmers machines.

Allis-Chalmers not only builds a complete line of cement-making machinery—kilns, crushers, grinders, screens—but also builds hundreds of other products to boost production and reduce operating costs in all basic industries.

No other company offers such broad engineering experience—such a wide range of industrial equipment!

Consult our representative in your country—or write

ALLIS-CHALMERS MANUFACTURING CO.
General Machinery Division
Milwaukee 1, Wisconsin, U. S. A.

Electrical Equipment

Steam and Hydraulic Turbines, Condensers

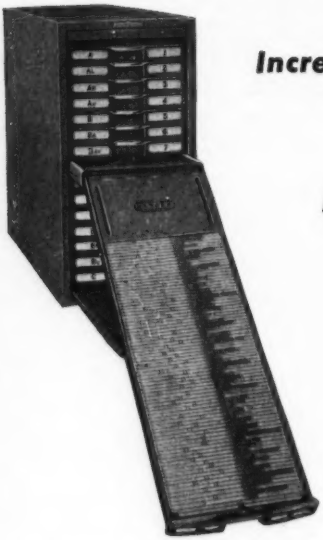
Crushing, Cement and Mining Machinery

Centrifugal Pumps

Flour and Sawmill Equipment

Serving All Industry

FOR MORE THAN A CENTURY



"Graph-A-Matic" Signals tell — at a glance—the key facts you need for effective daily control of your business.

Increase your profits

. . . Cut your costs wit

MODERN

KARDEX

VISIBLE SYSTEMS OF

BUSINESS CONTRO

Have you seen *Modern* Kardex? It's the handsomest, most rugged, easiest-to-use visible record yet developed—bar none! And Modern Kardex offers new *systems*—new ideas and improvements—to give you closer, more profitable control of your company's operations *plus* large savings in clerical work.

Write today, on your business letterhead, for details on how any of the following Modern Kardex systems may be applied to your organization: Sales Control . . . Production Control . . . Inventory Control . . . Purchasing Records . . . Personnel Records. Regardless of what type of business you're in, or whether your company is large or small, Modern Kardex assures utmost efficiency at lowest possible cost. Address your letter to Department A, Export Div., Remington Rand Inc., 315 Fourth Ave., New York 10, N. Y.

Remington Rand

THE FIRST NAME IN BUSINESS SYSTEMS

March 1948 • McGRAW-HILL DIGEST • Volume 3 Number 3

Penicillin production in large volume was made possible through war research. Penicillin vials were stoppered under aseptic conditions with the aid of sterilamps and air conditioning.

War Research Reconverted

From military scientific discoveries have come highly important peacetime benefits, including many new industrial products and methods

New knowledge gained through military research is having tremendous peacetime benefits. As the result of radioisotopes, byproducts of the atomic pile, the biological functions of vitamins, hormones, enzymes, and minerals are better understood. Carbon 14 has actually "tagged" cancer producing chemical in the body. It also has thrown new light on photosynthesis, and important results in the production of sugar cane already have been achieved.

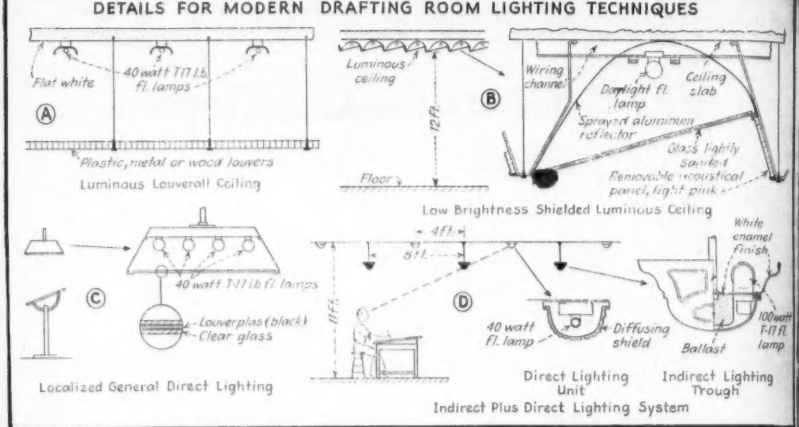
In industry, radio-isotopes are paying off. Studies of friction and of the underground structure of oil fields have been facilitated. Radioisotope traces show the molecular structure of alloys and measure the sulphur and phosphorons content of iron and steel. This is expected to result in cheaper and purer products.

Many new techniques and instruments were discovered in the course of atomic energy research. One is a detector which finds leaks in hermatically sealed systems by using helium as a "tracer" gas. As a production-line tool, it is assuring the perfect inspection of gaseous systems.

Another indirect benefit of atomic research is the development of oil-diffusion pumps which can create vacuums hitherto unknown to man. These help to produce better products such as vacuum tubes and coaxial cables.

In research done in the atomic-energy project on fluorine chemistry, a new class of compounds known as "fluorocarbons" was discovered. These will not burn or react with any of the common chemicals. As lubricants, they promise to be far superior to conventional oils and greases for heavy-duty bearings. The taming of fluorine promises countless new products ranging from improved paints, plastics, insecticides, and textiles to better electrical apparatus.

There are several interesting peacetime results of the radio proximity fuse. The subminiature vacuum tubes and "printed" electronic circuits, combined with high-dielectric ceramic capacitors, permit the production of new and improved hearing aids, radios, and tele-



GOOD DRAFTING-ROOM LIGHTING—Details of lighting techniques recommended for drafting room lighting are shown schematically. In detail A, low-brightness 40-watt lamps may be used in reflectors, or bare above louvered ceiling. Detail B shows an all-luminous ceiling of low brightness, with glass angled to eliminate direct glare. Detail C represents a lighting technique suitable for an open roof-truss area. A complete direct lighting system supplements a complete indirect lighting system in detail D. Minimum light intensity should be 50 footcandles; 100 footcandles is desirable if undue brightness contrasts or other objections are not introduced.—Elec C & M, Ja, 59

vision sets. A tiny wristwatch radio transmitter is the latest development. The VT fuse itself has been used to explode water bombs over forest fires at the height calculated to have the greatest effect.

Radar has been applied to peacetime marine navigation. For the first time a vessel need not lay over in port because of possible accidents in fog or adverse weather. On the Ohio River, radar-equipped towboats avoid delays which cost $100 an hour.

Out of research on supersonics have come instruments for detecting flaws in metal products by nondestructive tests. Supersonics also are being used to kill bacteria, homogenize milk, speed chemical reactions, mix paint, precipitate dust particles from smoke, and increase the yield from plant seeds.

A war-developed chemical, copper-8-quinolinolate, protects fabrics and leather against mildew in humid climates. If incorporated into the tanning agents for leather, it is said to prevent transmission of athlete's foot in shoe stores.

Woolen garments are being made shrink-resistant by a process developed by the armed services. Winter clothing will be lighter as a result of another war development — treatment of silica gel with a monomolecular layer of a special chemical to convert it to a remarkable insulant.

The revolutionary silicones already are being applied in at least half a dozen forms. Extremely stable to heat, electrical forces, and many chemicals, this material is finding use as elastic and rigid insulation, as grease and oil, and as a resin to bind high-strength laminates. —Prod Eng, Ja, 81

Television Business Booms

Industry looks forward to great expansion during the coming year. Predict 750,000 sets in use at end of year. Production 24,135 sets a month

Although several problems of television remain to be solved, telecasters and equipment manufacturers believe 1948 will be a boom year. By spring of 1949, they predict that there will be 750,000 sets in use throughout the United States, the bulk being centered along the eastern seaboard, with expansion to West Coast probable. Main reason for the prophecy is the rapid rate at which receiving set manufacturers have increased production—from 5,437 sets a month in January, 1947, to 24,135 sets a month by November.

The varied audience presents a problem to advertisers, but executives feel that each member of the family will develop new living habits to permit viewing his or her favorite programs.

Today, infant networks exist along the eastern seaboard, making use of coaxial cables or micro-wave relay stations to "pipe" programs beyond normal transmission range. Currently, New York City, Philadelphia, Baltimore, and Washington are connected by coaxial cables; New York and Boston soon will be connected. General Electric uses a micro-wave relay network to carry programs from New York City to its outlet in Schenectady (see McG-H Digest, Dec. 7, p. 16).

Currently, price is a high barrier to mass use of video sets. Recently, sets costing under $250 have reached the market. These smaller sets usually have either 7 or 10-in. viewing screens, but new magnifiers costing between $10–$60 can enlarge the image of a 7-in. screen to that of a 15-in. screen. Cost of projecting television is also high. Philco, General Electric, U. S. Television, and RCA are using a 5–6-in. viewing tube and an optical system to enlarge the image. This viewing tube is an item of major cost.

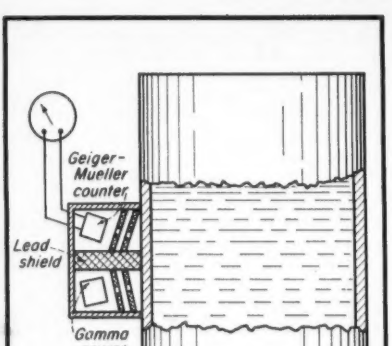
Rate at which component parts of receivers can be produced is the industry's greatest bottle neck—hand-blown glass viewing tubes are a major factor, cabinets another.

In 1946, there were 14 companies manufacturing receiving sets, and 22 more began production last year. Most companies restrict allocation of output to those areas served by broadcasting stations. Twelve cities now are served by 19 stations; 54 stations have construction permits; 64 more have applied for permits. Radio stations and newspapers primarily own the stations.—Business Wk, Ja 10, 25

Popular television receiver with 15-in., direct-viewing screen, manufactured by DuMont. Here studio shows are appearing, but sports will dominate.

Radioactivity

There is hardly an industry which cannot use radioisotopes to good advantage.



Specific gravity is measured by a Geiger-Mueller counter that detects back-scattering of gamma rays.

LITERALLY tens of thousands of potential industrial uses of radioisotopes exist. Virtually every industry can profitably utilize the properties of one or more of the hundred odd radioisotopes whose half-lifes and availability permit their consideration for industry.

Consider, for example, how the rayon industry might use radioactivity and tracer techniques. Uses adaptable in this industry are typical of those in many others, such as rubber, plastics, fine chemicals, petroleum refining, and paper. The examples to be cited are merely illustrative of what might be done—not what has been done or what is contemplated in the immediate future.

If tracer quantities of radioactive sulphur-35 as carbon disulphide are added in the xanthating process, there are several uses to which it could be put in process control. Continuous routine check of sulphur removal can be made by placing a Geiger-Mueller counter in close proximity to the rayon filament or the solutions through which it passes. Total amount of sulphur removed in the coagulating bath can be determined quickly. Also, a check is easily made after the desulphurizing bath to determine whether complete removal of sulphur has resulted. It is quite possible that automatic electronic controls could be devised to keep the coagulating and desulphurizing baths within predetermined concentration ranges by coupling the output of the Geiger-Mueller tubes through a suitable servo-mechanism to valves on chemical solution tanks.

Danger from highly poisonous hydrogen sulphide, carbon disulphide vapor, and mercapatans liberated in the coagulating bath can be alleviated by using carbon disulphide tagged with sulphur-35. Radioactivity monitoring devices placed in areas where leaks are likely to occur can be made to sound an alarm when sulphur containing gas or vapor escapes.

Such monitoring devices could detect a leak before plant personnel could smell the odor of the escaping gas. A portable radioactivity detector could find the exact location of the leak.

In preparing the viscose solution, the dissolving and dilution process can be controlled automatically by radioactivity techniques. A patent has been granted (U. S. Patent 2,304,910) for determining specific gravity of fluids by measuring back-scattering of radioactivity from the solution being measured. The amount of scattering depends upon the density and composition of the fluid. An instrument of this type can easily be made to activate automatic controls. The backscattering phenomenon also has many other applications, such as inspecting closed

in Processing

How they may be applied to the control of chemical processes is discussed

tanks and pipes for internal corrosion.

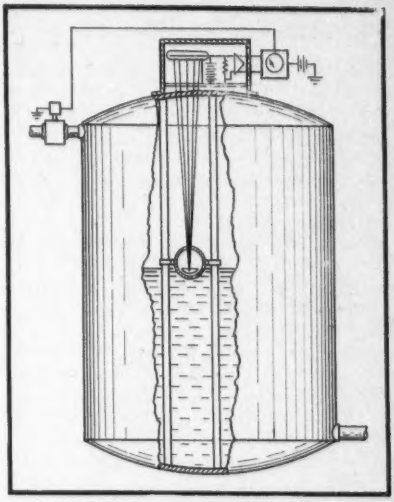
A liquid-level gage utilizing radioactivity recently has been developed. It can be applied in rayon manufacture, being particularly useful where highly corrosive liquids are to be measured or where it is desired that the tank have no openings through which gas or vapor can leak. The gage utilizes a float containing a hard gama emitter. The float is placed inside the tank, and a Geiger-Mueller counter coupled to a counting-rate meter calibrated in liquid depth is mounted directly above the float and outside of the tank.

In the dyeing process, radioactivity can aid in controlling dye concentration and weight of dye absorbed by the fabric. If one or more radioactive atoms were incorporated into the dye molecule and tracer quantities of it were mixed with the normal dye, the concentration of dye present in either the cloth or the dye vat could be continuously and automatically determined by Geiger-Mueller counters. Electronically actuated controls can regulate the dye bath concentration.

The mechanism by which free sulphur appears in the coagulating bath and in the yarn is not fully understood. Tracer amounts of sulphur-35 in either the carbon disulphide or sodium sulphite could follow the course of sulphur.

If properly controlled, small amounts of manganese, iron, copper, chromium, and certain other metallic ions in the viscose solution might advantageously accelerate the aging and ripening process. Radioisotopes could be used to determine the lower limit of metallic ion concentration which affects aging; this limit may be below that detectable by conventional chemical methods.

To eliminate health hazards to plant



Liquid-level instrument uses a counting-rate meter and a guided float containing a gamma ray emitter.

personnel, isotopes of fairly short half-lives and with as low energy level as feasible should be used. Where radiation is unshielded, it is quite important that only alpha or beta emitters be used, unless gamma emitters in low concentration can be utilized satisfactorily.

Most of the possible uses described above provide for removal of radioactive material during the process. In the few instances where this is not the case, radioisotopes of short half-life should be used in sufficiently low concentrations as to constitute no health hazard to the ultimate user.

It is unlikely that radioactivity will cause widespread revolutionary changes in the process industries within the next several years. Inertia and lack of trained personnel will slow its application. Also, the advantages of using tracer techniques frequently are out of proportion to required capital outlay.—Nucleonics, Ja, 33; Chem Eng, Ja, 103

SOIL-CEMENT CANAL LINER PLACED MECHANICALLY

A ¾-mile test section of irrigation canal in southern Oklahoma was lined mechanically with plastic soil-cement in a continuous mixing and placing operation. Tests show that in pervious, sandy soil, such linings can be placed with rapidity and efficiency, and the lining may be used on large-scale operations. Bottom width of canal was 4 ft.; side slopes, 1 on 1½; water depth, 2 ft. An 18-ft. long traveling slip-form and a traveling pugmill mixer plant were used for placement of the lining.

Slip-form was drawn along by tractors, soil and cement being windrowed on canal berm and picked up by traveling mixer. Conveyor belt transported mix to hopper of slip-form. Water was hauled by truck.

Best continuous run was 1,375 lin. ft,. or 2,292 sq. yd., in 4 hr., 40 min. Engineers believe equipment could lay 3,000 sq. ft. of 3-in. lining per day. Lining costs averaged $0.52 per sq. yd. Average density of lining was 104.9 lb. per cu. ft. and moisture was 20.8%. Satisfactory mix was found to be 11% cement by volume.

A 1-in. damp soil cover was found to be the best curer. White-pigmented curing compound, applied by sprayer, gave good cover with a single-coat application. —Eng News-Rec, D 25, 48

PIPE PROTECTS MINE CABLE

Consolidated Coal Co. uses 20-ft. sections of 3-in. steel pipe to protect 1,600 ft. of 2,300-volt cable lying on the mine floor next to the rib on the clearance side of the haulway. It is not buried and is covered only where track crosses headings. Lengths of pipe were butted together and joints covered with 4-in. dia. sleeves, 12 in. long. Sleeves were secured by four track spikes wedged between pipe and sleeve, then lightly spot welded.

As each length of pipe was laid, a ½-in. wire rope was pulled through length by hand. When all sections were in place, the electric cable was attached to one end of the rope, the other end of the rope being connected to a mine locomotive, which pulled the cable through the pipe. One 800-ft. section of pipe was straight, and the other 800-ft. section included a 45- and a 90-deg. angle.

At midpoint, the two cables join at a junction box placed in a 5x3x3-ft. vault. Junction box sits without anchorage on a tile pedestal.—Coal Age, Ja, 74

WATER WILL POWER FRENCH WIND TUNNEL

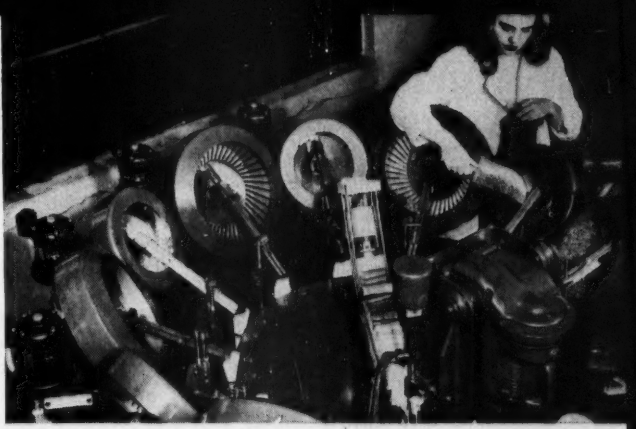
A waterfall of 2,835 ft. will drive two 110,000-hp. Pelton water turbines to supply power for the Avrieux, France, wind tunnel. Test chamber is 46 ft. long; maximum dia., 26¼ ft.; overall length, 1,280 ft.; weight, 3,050 tons. Unit is potentially able to produce airspeeds of Mach 1, reduced to 0.925 with models half the diameter of the test section. Jet engines up to 10,000 hp. can be accommodated. It should be in operation during 1950.

An annular vent between exit of the tranquillization chamber and the entrance to the convergent connection will allow for evacuation of air to the atmosphere. Beyond the test section is a diffuser with initial opening angle of 5 deg. and beyond this an elbow turns air 90 deg. by 12 hollow fins fitted with adjustable flaps. Tunnel diameter is cut to 49 ft. near the two propelling fans. Spaced about 8 ft. apart, the 49-ft. dia. propellers have 10 and 12 blades, respectively, rotating in opposite directions to redress fluid flow. Speed is 250 rpm.

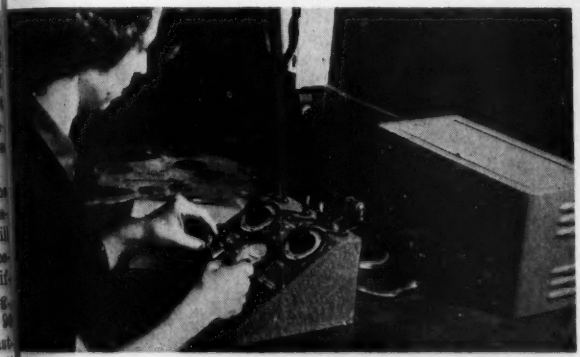
Below second elbow is a small diffuser section preceding the air-admission apparatus composed of two control cylinders with adjustable flaps. A 217-ft. long diffuser enables sufficient recuperation of kinetic energy.

Tunnel is of welded steel tubing 0.236–0.472 in. thick, bound by rings 5 ft. apart.—Aviation Wk, Ja 19, 27

SORTS SMALL PARTS FAST—Packaging three times as many items per hour as six men did previously by hand, this Minneapolis-Honeywell Regulator Co. machine sorts and packages small pieces of equipment such as nuts, bolts, and rivets. The machine selects the proper number of items, drops them into an envelope, staples the envelope, and flips it out for mailing.—Business Wk, Ja 17, 62

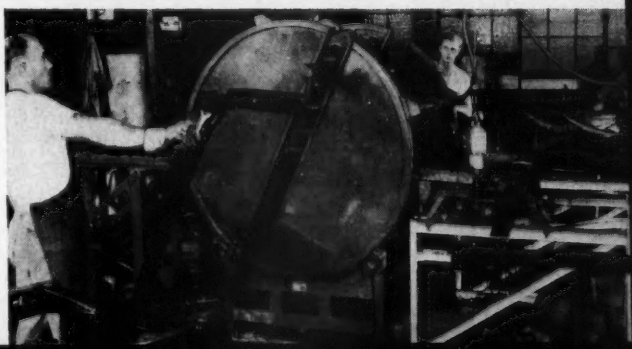


Fast Production and Handling



FAST RESISTANCE TESTER—Pigtail resistors are checked against standard at rate of 1,800 per hr. by this percentage-limit bridge, with an electronic null detector. Farnsworth Television and Radio Corp. designed it for maximum utility after job analysis and motion study. Equipment is divided into two units, so only small panel is directly in front of operator. This confines operation to a small space. —Electronics, F, 110

TURNOVER FIXTURE—Developed at Studebaker, this device eliminates former hoist-and-sling method of turning an automobile frame up side down after boring and before attaching springs and axles. It consists of two slotted forks fastened together and turning on four ball-bearing rollers supported on a welded base.—Am Mach, Ja 5, 129



JOB-BUDGET PLAN REDUCES LABOR TROUBLE

Started 21 years ago as a means of stabilizing work, the job-budget plan of Seaboard Air Line R. R. now covers 2,700 shop workers. The railroad is under no financial obligation to pay workers for work not done, and is not legally bound to guarantee work or wages except for a 10-day notice period. But since the institution of the plan, labor turnover and labor troubles have been reduced sharply; morale is up. The railroad also believes the program has saved money through elimination of peak-season overtime. The biggest benefit to the road has been the close management-union cooperation it has fostered.

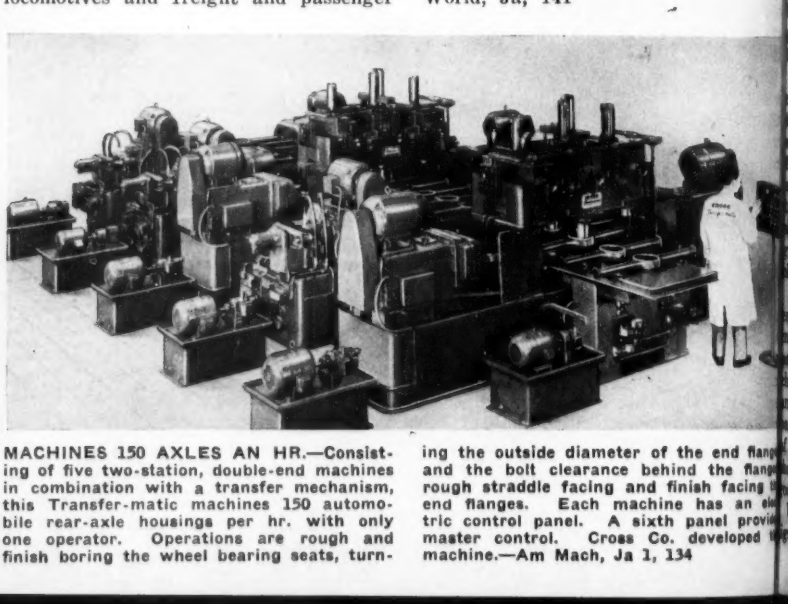
The union feels the plan has spread work, tending to keep employment and wages steady; wiped out idleness through elimination of shutdowns; helped workers to plan on the coming year's income.

Management predetermines how many locomotives and freight and passenger cars will be needed for the coming yea wnat type they will be, and how ma miles they will travel. This gives the an estimate of necessary manpower i each category. When these estimates a determined, the union is called in to over the plans. The union seniority lis are used in selecting working force.— Business Wk, Ja 3, 58

96-FEED CIRCULAR KNITTER

With 96 feeds, a new 26-in. dia. circul knitting machine, developed by Supre Knitting Machine Co., knits cotton yar from 8/1 to 36/1 or their equivalent wool, rayon, or silk. Wide striped cloth stripes 3¼ in. wide—is produced at th rate of 125 yd. per hr. Each feed is co trolled by an individual micromatic co trol. Interwinding floating take-up kee uniform tension between knitting e ments and take-ups.

Yarn stand is stationary, only th cylinder and take-up revolving.—Text World, Ja, 141



MACHINES 150 AXLES AN HR.—Consisting of five two-station, double-end machines in combination with a transfer mechanism, this Transfer-matic machines 150 automobile rear-axle housings per hr. with only one operator. Operations are rough and finish boring the wheel bearing seats, turning the outside diameter of the end flang and the bolt clearance behind the flang rough straddle facing and finish facing t end flanges. Each machine has an el tric control panel. A sixth panel provi master control. Cross Co. developed t machine.—Am Mach, Ja 1, 134

AIR VIEW ON RAILWAY—Travelers aboard the new Vista-Dome Zephyrs enjoy a view of the surrounding countryside similar to that from a low-flying airplane. Comfort is provided, too. Each seat has foot rests, ash tray, reclining back, and adjustable arm rest. Lowered floor provides head room.—Am Mach, Ja 15, 127

100-YR.-OLD BARITE MINES ADOPT MODERN METHODS

Modern earth-moving equipment and more efficient beneficiation methods have boosted production substantially and improved living standards of workers at the 100-year-old barite mines in Missouri.

Diesel-powered, crawler-mounted shovels load material into dump trucks and transport it 1 mile to washing plants. A strong jet of water removes soil and sand from the large chunks of geoidal quartz and barite. Then material is fed to a traveling grizzly on which barite is dodged off by hand, or to a rotating grizzly which knocks barite off by tumbling.

Grizzly undersize passes to log washers where agitation, beating, and washing remove most of mud. Washed product passes to a trommel with small-dia. discharge to keep unit half full of material and cause a grinding action which knocks barite off the quartz lumps to which much of it clings. Barite passes out through the ¾-in. trommel screen. Remarkably good separation is achieved.

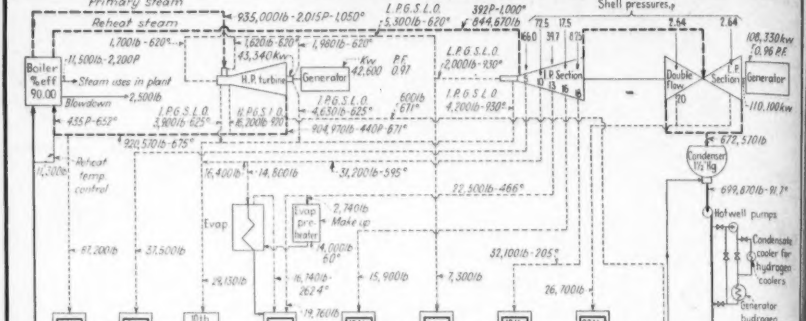
Undersize from trommel passes to jigs, then jig concentrate goes to a rake classifier for removal of fine silica as an overflow. Underflow is the main salable product.—Eng & Min J, Ja, 71

CHEAP DC. POWER SOURCE

Metallic-oxide rectifiers, such as selenium-oxide units, are ideal for converting ac. current to dc. for operating small constant- or adjustable-speed motors. For sizes from 1 to 15 hp., the cost is less and the efficiency higher than for a motor-generator set. Voltage regulation is about the same, maintenance is simpler, and mounting is easy because no foundation is required. These facts are based on 18 months' operating experience in a Westinghouse plant.—Oper Eng, Ja, 46

NYLON BOLSTERS CUT POWER

Lower frictional drag in nylon bolsters cause them to run cooler without apparent wear to either the bolster or the spindle. In tests, bolsters ran nine weeks without oiling. Power savings were reported to be 11% less at 9,000 rpm. and 13% less at 11,000 rpm.—Textile World, Ja, 137



Heat-balance for efficient new steam-electric station. Heat rate is 9,270 Btu. per kwh.

Advanced Power-Plant Design

Highest heat rate is combined with low-cost operation and reliability in new steam-electric plant. Many new features have been incorporated

American Gas & Electric Service Corp. has designed a steam-electric generating plant with unusually high efficiency and low operating cost. It has the highest heat rate of any steam-electric plant—9,270 Btu. per net kwh. output with 90% boiler efficiency and a net output of 141,520 kw.

Heat Cycle—This high efficiency is achieved with a 2,000-psi., 1050°F. initial-temperature, 1000°F. reheat cycle (see heat-balance diagram). The reheat cycle gives about 5% better heat rate than non-reheat, with a higher first cost of only 2%.

A high degree of reliability also is designed into the plant. Although the condenser is being designed for minimum condensate refrigeration and 0.03 cc. per 1 oxygen content at rated load, a deaerator to operate under positive pressure is being installed to insure thorough de-aeration of feedwater even under extreme load changes. This is insurance against boiler corrosion and trouble. To preclude frequent cleaning of the generator hydrogen coolers, necessary when river water is used, a portion of the condensate is passed through the coolers after leaving the condenser. A condensate cooler uses river water in summer.

Turbine Features—The cross-compound turbine is a new combination of high- and low-pressure turbines. The 3,600-rpm. high-pressure element has a 35,000-kw. rating and a capability of 42,000 kw. Its throttle conditions are 2,000 psig., 1050°F. The two emergency stop valves, as well as the turbine inner shell, will be chrome-nickel-moly, columbium stabilized. Outer shell will be moly-vanadium.

The 1,800-rpm. low-pressure element

has an intermediate-pressure turbine in tandem with a double-flow low-pressure section. The whole is rated at 95,000 kw. with a capacitance of 108,000 kw. The intermediate-pressure section receives steam from the reheater at 375 psig., 1000°F., and exhausts at about 8 psia. to the double-flow low-pressure section. Its high-temperature parts will be of moly-vanadium.

Among features that improve reliability are: (1) Protection against sudden temperature changes by an initial pressure regulator. (2) Protection against excessive starting speeds by a two-speed, motor-operated, synchronizing device on the main operating governor. (3) Automatic steam-seal regulator and unloading valve. (4) Automatic low-vacuum trip.

Largest Boiler—Perhaps the largest that has been projected anywhere from the standpoint of net input, the boiler has a total heat input of 1,300,000,000 Btu. per hr. to produce 150,000 kw. gross generation. It is designed for maximum continuous steam output of 935,000 lb. per hr. at 2,035 psig, 1050°F. at superheater outlet. A temperature of 1060°F. will be maintained between 850,000 to 925,000 lb. per hr. by an attemperator between primary and secondary portions of the superheater.

After passing through the high-pressure turbine, the steam will be exhausted at around 400 psi., and some 850,000 lb. per hr. will be returned at 650°F. to reheater and raised to 1000°F. This temperature will be maintained at 1000°F. between flows of 750,000 and 850,000 lb. per hr. by an attemperator just ahead of the inlet header to the reheater.

The ten pulverized coal burners per boiler will be of the multiple intertube type and will fire vertically downward into the completely water-cooled tangent tube furnace. The furnace is divided laterally by a curtain wall of bare tubes which provide a substantial increment of cooling surface.

Another outstanding feature will be an attempt to run without induced-draft fans. To do this the entire casing will be made tight for a furnace pressure of 15 in. of water.

For plant cleanliness, all hot-air ducts under pressure will be welded, and bellows-type expansion joints will replace slip-type joints.

Full condenser back-washing will be provided, it being possible to reverse the flow through each half of the condenser to remove leaves. Revolving screens are considered inadequate for high reliability.

Electrical System—Outstanding feature of the electrical arrangement is extreme simplicity. A 3-phase, 52,500- and two 62,500-kva., 3- phase transformers step up the high-pressure generator and the two windings of the low-pressure generator to 132,000 volts through a single switch to each of the two 132,000-volt buses. No low-voltage switches or buses are employed.

The plant site is contiguous to coal reserves which will permit use of underground coal gasification, if this becomes desirable.—Elec World, Ja 3, 30

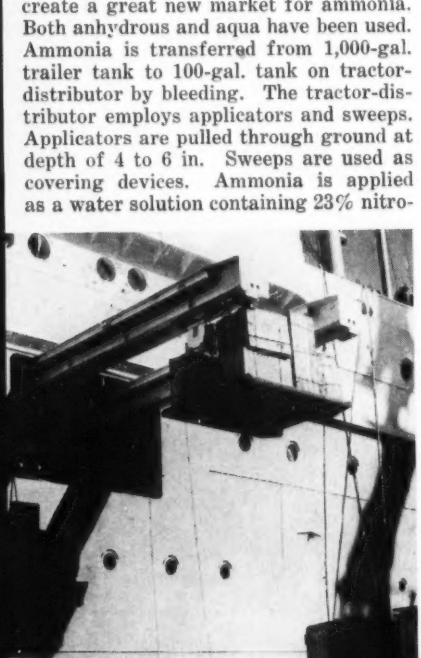
CITIZENS' RADIO—Developed for the personal use of individual citizens, the two-way radio held in this man's hand weighs only 11 oz. It was designed by Gross Electronics, Inc., to operate on the 460-470-mc. band allocated for a citizens radio service. No license is needed for such equipment. Industrial applications are expected, as in construction work.—Electronics, F, 148

INCENTIVE UNLIMITED

Under a no-limit incentive plan, measured average efficiency increased from a low of less than 50% to an output of 200% of standards at Apex Electrical Mfg. Co.'s Cleveland plant. Management agrees that there shall be no limitations on earnings, earnings shall be calculated daily, and established standards are guaranteed unless there is a change of equipment, methods, or work requirement.—Am Mach, Ja 1, 111

CHEAP FERTILIZER

Successful applications of ammonia directly to crops in soil provides farmers with cheap nitrogen fertilizer and may create a great new market for ammonia. Both anhydrous and aqua have been used. Ammonia is transferred from 1,000-gal. trailer tank to 100-gal. tank on tractor-distributor by bleeding. The tractor-distributor employs applicators and sweeps. Applicators are pulled through ground at depth of 4 to 6 in. Sweeps are used as covering devices. Ammonia is applied as a water solution containing 23% nitrogen or as a gas containing 82%. Over 200,000 acres of corn and cotton were fertilized with anhydrous ammonia in 1947. It has been applied to oats and sugarcane, and application to rice is being studied.—Chem Eng, Ja, 114



NEW DESICCANT PROTECTS HYGROSCOPIC FOODS

Desiccite, a non-lime-base desiccant developed by Filtrol Corp., can be used to protect packaged hygroscopic products, such as potato chips, cereals, crisp bakery goods, and pharmaceuticals. It also can be used to reduce moisture content of packaged dehydrated vegetables from 10 to 6% without danger of browning. The new desiccant is placed in a leakproof container and packaged along with the product.

A hydrous aluminum silicate, the desiccant is inert, tasteless, odorless, nontoxic, non-corrosive, nonabrasive, and neutral. It absorbs moisture by physical means and will not soften or liquify. It absorbs proportionately more moisture at lower humidities than standard desiccants, and can be regenerated by heating 2-3 hr. at 300-350°F.—Food Ind, Ja, 86

HIGH-CYCLE FLUORESCENTS?

On 540-cycle alternating current power supply, a 40-watt fluorescent lamp operates at 120% overall efficiency. The ballast can be a small condenser. Resonant starting involves small, light components.

Conversion from 60 to 540 cycles, however, involves equipment, which, in small

ELIMINATES SHIP DECK BOOM—One cargo door of the "President Cleveland," American President Lines, Ltd., is equipped with this built-in loading mechanism. Top-deck-booms and winches are eliminated, freeing deck for passenger space. Two rectangular beams and trolley carry traveling platform. Loading platform is raised and lowered by hoist and steel cables.—Business Wk, Ja 17, 64

WILL CARRY THREE TONS—England's first freight-carrying helicopter will be this Cierva Autogiro Co. W 11. Rotors are driven by 1,640-hp. Merlin engines. It carries 24 passengers or 3 tons. Range is 232 miles; top speed, 154 mph.—Aviation Wk, Ja 19, 17

units, presently runs at 70% efficiency and more than offsets gain in fixture efficiency. The market opportunity offered by high-cycle fluorescent lighting, however, may stimulate development of high-efficiency conversion equipment.—Elec C & M, Ja, 45

X-RAY INSPECTION BEST FOR SPOT WELDS

Radiography is more useful for spot-weld inspection and quality control than any other nondestructive test method. A large number of significant weld properties are revealed and measured with a high degree of sensitivity. The inspection can be carried out at any point in a fabrication process and will give rapid and reliable indications of weld quality.

With X-ray control of the spotwelding process, the welding equipment can be adjusted to operate more nearly in the center of the optimum range for the specific material and gage combination. This permits wider variation of welding performance without production of defective welds, and any tendency toward variation can be detected and corrected before objectionable welds have been produced.—Weld Eng, Ja, 54

TO USE MOTHER TUNA SHIPS

Although mother ships were considered impractical in tuna fishing, operation of the "*Pacific Explorer*" has induced a number of tuna canners to convert, or plan to convert, vessels in the 500-1,000-ton class for receiving and freezing tuna in tropical waters. The frozen fish then will be transported to the United States for subsequent processing and canning. With this advanced method, smaller fishing vessels of limited range can go to the heart of the Central American tuna grounds, depending on mother ship for supplies. Such an operation will provide a longer and more productive season.

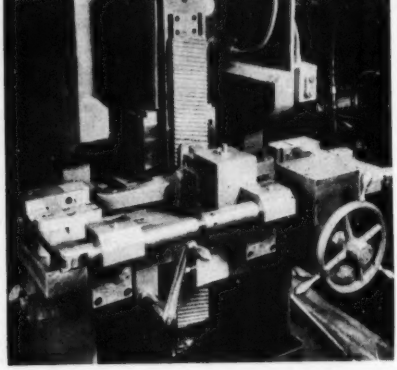
The 410-ft. "*Pacific Explorer*" is a former bulk cargo ship converted to accommodate 240 persons and provide processing, freezing, and storage facilites. It returned from maiden voyage with 2,250 tons of frozen tuna.—Food Ind, Ja, 111

ELECTRONIC METALS

At the Radium Elektrizitaets factory in Germany, tungsten wire is produced from tungsten powder by pressing, presintering, and sintering. The sintered bar is then hot swaged to rod and wire, and the hot wire drawn to sizes for tube and lamp filaments.

Pure degassed iron was used by the Japanese to replace molybdenum and nickel for electrodes, getters, and other metallic parts of electron tubes. The iron has durability and electron emission comparable to the metals it replaces.

To produce coated wire for radio tubes, Fernicklon has been devised by Kenmore Metals Corp. Iron or copper wire is electroplated (with nickel, silver, or other metals) and cold-drawn to diameters as fine as 0.0038 in. It can be swaged or hammered.—Electronics, F, 190



In surface broaching automobile exhaust manifold castings, on a 15-ton vertical press, about ⅛-in. stock is removed at one pass, and production is 125 parts per hr.

SURFACE BROACHING INCREASINGLY USED

Broaching has achieved new popularity in recent years through the advent of the surface-broaching machine. Metal removal rates are so high that considerable ingenuity has been required in the design of fixtures which will withstand the heavy cutting stresses and yet be easy to load and unload.

Considered at one time to be suitable only for mass production because of the high cost of tools and equipment, broaching now is successfully applied to small-lot manufacture through the development of multi-purpose fixtures. In the future, many parts made in relatively small-lot quantities will be surface-broached when the manufacturing quantities are re-ordered often enough to justify relatively low cost multi-purpose fixtures. In this regard, most universal slab broaching fixtures are cheaper in terms of tool and setup cost per piece than many nonfixture machining setups on other machine tools. Further development of universal fixtures will mean still wider use of surface broaching—Am Mach, Ja 1, 77

RAYON SPUN, PACKAGED IN CONTINUOUS PROCESS

Rayon is spun and packaged continuously by a new "Nelson" process machine, developed by Dobson & Barlow, England. Machine, divided into a wet and dry side, spins viscose on the wet side, yarn passing upward to a washing and drying process and then downward to the drying side where it is packaged. Filaments of 1½ denier can be spun without difficulty; process is best suited for yarns of 150 den. or less with filaments of not over 4 den. Yarns up to 450 den., with 5- to 6-den. filaments, have been spun on the machine.

In stretch-spun yarns, dry tenacity of 2 gpd. with 20% extensibility is obtained in standard coagulating bath. Yarn with filament deniers of less than 2 are spun at the rate of 71 yd. per min.; 2- to 4-den. filaments are spun at 80 yd. per min. Power consumed is 3.2 kwh. per lb. Spindle speeds of 6,500 rpm. are recommended. Spinning package produced is 8-12 oz.; 3¾ lb. ring-type packages can be produced also. Yarn is not desulphurized.

Standard machine has 49 spindles, is 45¼ ft. long, 6 ft. wide.—Textile World, Ja, 142

FATIGUE ALLOWANCE TABLES

Fatigue allowances, established at Motorola, Inc., have reduced grievances. Allowances are graduated from 1½% for repetitive bench jobs to 11½% for highly fatiguing work, as in the foundry.

Only three factors and conditions must be evaluated—mental and visual demand, physical demand, and working conditions. Each job is evaluated and points for each condition awarded. Points are totaled and converted to allowance percentage from the fatigue allowance chart. Chart is built in increments of 5 points, starting at 25 points = 1½% and ranging up to 125 points = 11½%.—Factory, Ja, 118

Analyzing Materials Handling

Westinghouse Electric Corp. plan for solving materials handling problems involves complete study of factors. Three forms eliminate false economies

A new technique for analyzing and solving materials handling problems, developed by Westinghouse Electric Corp., is based on comparative analysis methods and built on three forms. The three forms are: (1) Single-item handling questionnaire, for use if item makes but one move. (2) Materials handling analysis, for existing or proposed handling operations in series. (3) Check list of materials handling equipment, a guide to handling equipment to be used or purchased.

In addition to information listed on the forms, the engineer also needs to know: Building heights, aisle widths, column spacing, door clearance, elevator capacity, and permissible floor loads.

Five other important factors also must be studied:

1. **Economies**—Four factors must be considered to avoid "false economies" in materials handling equipment—building renovations to be necessitated by the new equipment, initial equipment costs, cost of operating equipment, and maintenance costs. All equipment costs must be figured on an hourly use basis.

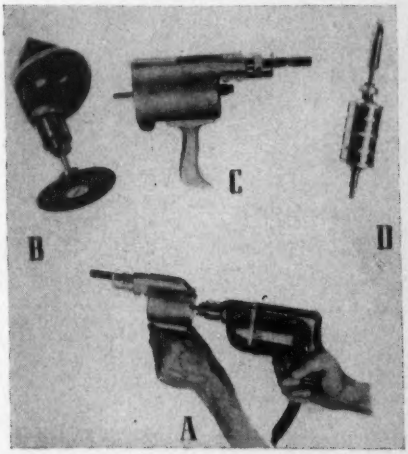
2. **Availability**—No handling equipment is of any value until it is functioning. Since lines rarely are permanent, consideration must be given to availability of equipment needed.

3. **Acceptance**—Persons to use the equipment must understand the significance and advantages inherent to the equipment, or its value is decreased greatly. This explanation must be thorough.

4. **Safety**—Since 40% of industrial accidents involve materials handling equipment, safety of the equipment operator and third parties must be studied.

5. **Suitability**—Both quality of performance and compatibility with other equipment must be weighed. Almost always there is more than one machine that can be used to perform the move. Again, since lines are temporary in nature, the equipment should be applicable to future operations. If not, amortization charges will be much higher per unit.

After receipt of an analysis job, the engineer first must study the plant layout along with the proposed layout of the operation showing flow of products from operation to operation. With these lay-



MAKE DRILLS VERSATILE—Interchangeable attachments permit electric hand drill or drill press to be used for sanding, polishing, grinding, filing, and sawing. Attachment A, for hand drill only, converts rotary to reciprocating motion for sawing or filing. Disk sander B is for any electric hand drill or drill press. Saw and file attachment C fits any hand drill and most drill presses. Screwdriver attachment D, with screw finder, can be used with any hand drill and many drill presses. J. D. Whittle Co. introduced the attachments.—Am Mach, Ja, 158

outs, the engineer fills out the single materials handling form. Every item on the bill of materials may have to be entered. Items not listed on the single-item chart are entered on the materials handling analysis, giving point of origin and destination, distance, quantity, frequency, container, and transportation.

From these figures, the engineer can determine direct labor costs plus forecasts of equipment costs, giving a total handling cost of the operation. Time unit can be varied, determined by the length of time the line will be in operation. In setting times for movement of parts, the engineer should not figure th times but should turn them over to motion and time engineer for estimation.

Characteristics—size, weight, fragility, shape, etc.—of the part to be moved mus be studied. Each movement, from th time the part enters the plant until becomes an integral part of the complete assembly, is studied and listed according to sequence. Figures on quality are base on expected time line will be in produc tion. Frequency of moves and whethe parts must be inspected or counted during move must be noted. The handling cos per unit is calculated as the average bas rate of all labor engaged in material handling, plus the hourly cost of operat ing the equipment divided by the num ber of units. Figures from previou operations can be used.

Attempts to solve handling problem without considering relationship betwee operations will bring negative results. In tegrating of elements will be aided the engineer has a two- and preferabl a three-dimensional layout of the line This layout will necessarily have to b changed from time to time.

Containers for parts in movement ar the first basic consideration in material handling studies. Tierability of the con tainers and their ability to be move by various types of handling equipmen must be taken into account. After con sidering containers, equipment, and cos the "one best" method can be selecte

At the end of a predetermined perio after plan has been in operation, i should be studied critically to see ho closely forecasts compare with produ tion.—Factory, Ja, 88

DUAL-DUTY PALLET—This International Harvester Co. wooden pallet can be used both for shipping and storage of small parts. It is accessible from all four sides. When wire is cut, a hinged door opens. The pallets are knocked-down for reshipment. . . . A disposable pallet costing 50¢ to $1 is being manufactured by International Paper Co. It is made of double-faced corrugated sheets resting on short support columns. A 2x3-ft. pallet with nine 7-in. dia. supporting posts will carry 20 tons.—Business Wk, D 6, 84

120-PASSENGER TOUR BUS

Carrozzeria Viberti, Italian bus fram builder, is experimenting with a ligh weight, trailer-type bus for transconti nental tours. Made of lightweight alloy veneer wood, and plastics, bus accom modates 120. Reclining seats, washroom radios are provided.—Bus Trans, Ja, 8

TWO NEW FOOD PROCESSES RETAIN MORE THIAMINE

Two new food processing techniques—the short-time-high-temperature and agitating methods—increase thiamine retention. The short-high process involves heating the food by pumping through a tubular heat exchanger at 270–300°F. to effect quick sterilization before filling into sterile cans and sealing under sterile conditions. Semi-solid vegetable products retained 78–98% of the thiamine compared to 32–79% by conventional processing. Changes in other quality factors also were minimized.

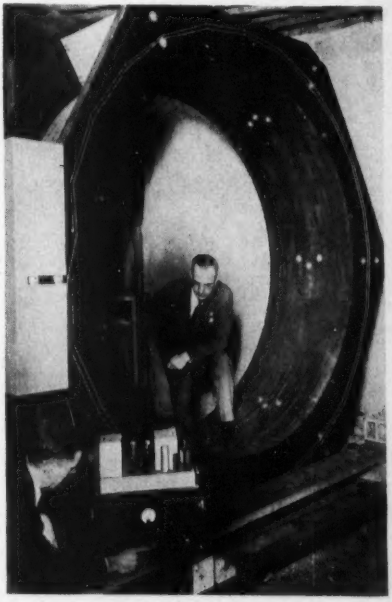
In the other new process, cans of vacuum-packed vegetables were agitated mechanically while retorting to speed heat transfer. White corn contained 30–60% more thiamine than when conventionally processed.—Food Ind, Ja, 82

FOR EROSION RESISTANCE

When a component is subjected to cavitation erosion, and freedom from maintenance delays is more important than initial cost, stainless steel is likely to be the best metal to use. In addition to outstanding erosion resistance, this metal has good mechanical properties and can be repaired by welding. For components such as high-speed pump impellers, a more readily castable material may be desired, such as silicon Monel, aluminum bronze, or copper-nickel-zinc alloy. Where casting properties are dominant, as in large ship propellers, choice tends toward high-tensile brasses, possibly modified by additions of nickel, iron, or aluminum.—Prod Eng, Ja, 110

WILL MAKE FLYING SAFER

Recommendations of the President's Air Safety Board in its final report covered four major points—fire prevention and control, maintenance and manufacture, pilots' and mechanics' proficiency, and research and development. Specific recommendations were: (1) airline hiring of full-time safety directors, (2) special certificates for mechanics doing special work, (3) immediate arbitration of grievances, (4) pilot retirement and disability pensions, (5) elimination of incentives for pilots flying in questionable weather, (6) higher pay for airport-control personnel, (7) higher standards of safety for nonscheduled lines, and (8) research on and development of safety fuels, hydraulic fluids, and fire-detection and fighting equipment.—Business Wk, Ja 10, 36



FINDS METAL IN LUMBER—Metal fragments and unexploded artillery shells will be located in 12 million feet of lumber by an electronic metal detector being built for the U. S. Corps of Engineers for use in timbering operations in the 3,718-acre forest tract at Fort Lewis, Wash. Logs will be floated through a 60-in. coil, and an electronic circuit measures voltage unbalance produced by the field to actuate alarms.—Electronics, Ja, 150

Better Paper Mill Methods

Sodium peroxide deinking used for first time, raising quality of paper and lowering costs. Improvements also made in coating and quality contro

First to use sodium peroxide in deinking waste papers, Newton Falls Paper Mill, an affiliate of McGraw-Hill Publishing Co. and Chilton Co., is reducing operating costs and improving quality. Developed in cooperation with E. I. du Pont de Nemours & Co., the deinking process consists of treating waste paper with soduim peroxide and caustic in a hydrapulper. The material then is subjected to a mild cook, and the cooked stock is passed over a riffler, screened, washed, and bleached. After a final wash, the stock is ready for the fourdrinier paper machine.

The process permits better utilization of waste papers. This is considered to be due to the peroxide's ability to modify and solubilize the various ink vehicles, as well as the starches, glues, and other organic components. Some bleaching and brightening occur during deinking. Furthermore, the peroxide persists to the end of the cooking step, in concentrations sufficient to inhibit the color reversion that groundwood undergoes when subjected to a hot, alkaline treatment. In this respect, the functioning of sodium peroxide differs from its bleaching action on groundwood-sulphite mixtures (McG-H Digest, Dec., 1947, p. 8).

It is practical to utilize lower grade papers and yet meet the high standard in paper quality. The amount of magazine stock fed into the hydrapulper has been increased from 50 to 75% and ledger stock reduced from 50 to 25%. At the same time the use of virgin pulp has averaged about 16% for the entire paper production.

Overall chemical costs are increased, but this is more than offset by savings elsewhere. Amount of caustic is only one-third that used in the caustic soda deinking process. About 25% less sodium hypochlorite is required in bleaching. Cooking temperature is reduced from 200 to 170°F., and cooking time from 4 to 1 hr., with important savings in high-pressure steam and greater production capacity. Yields have been higher because of less fiber degradation with mild cooking.

Among the most important results are the leveling influence and greater uniformity in the brightness of the pulp ultimately obtained after hypochlorite bleaching. Also, the brightness level has been raised from 70 to 78 points.

Freer flowing stock and a closer formed sheet result. Peroxide tends to disperse the ink and makes washing of fiber simpler. With the new microjet coating process, it is possible to coat this grade of paper and produce a good product.

Other improvements also were made in the paper mill. New microjet machines coat one side of the paper at a rate of 1,000 fpm. A rubber roll applies the dry coating, then excess coating is blown off by a ribbon of air. The web travels over a rubber-covered suction apron and comes off into a loop suspended in air, the height of the loop being kept constant by two electric eyes.

In drying, the moisture of the paper is measured and recorded by an instrument which measures the electrical resistance from a detector roll in direct contact with the continuously moving sheet of paper at the dry end of the machine. Changes in resistance are measured on a potentiometer bridge circuit and automatically recorded on a strip chart.

A uniform finish is developed on both sides by the calendar by means of a continuous constant-reading electronic Glarimeter. The instrument gives a reading of gloss on both sides of the web of paper as it is being supercalendered.—Chem Eng, Ja, 106

DRILLED-IN CAISSONS CARRY 5-STORY BUILDING

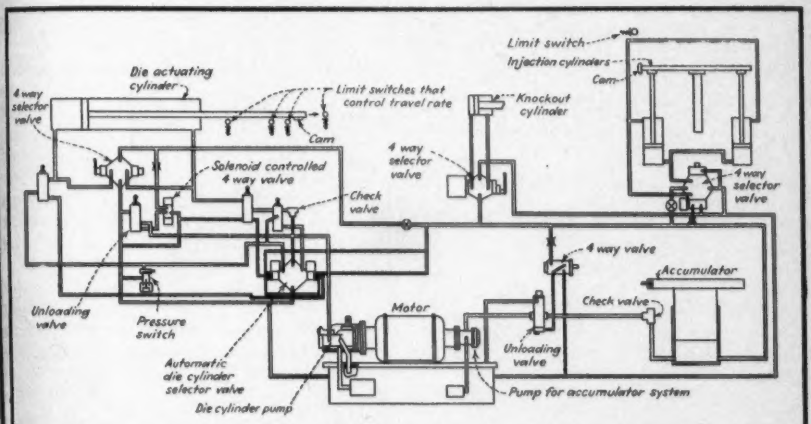
Because of difficult foundation conditions at the 5-story Coca-Cola Bottling Co. building in New York City, drilled-in caissons were used, extending from the second floor to sub-surface rock. Since foundation had to be non-yielding to preserve alignment of girder supports, and because obstructions restricted the possible number of supports, the drilled-in caissons were the best choice.

Outer shell is ½-in. thick, 38-in. dia., spiral, welded steel cylinder with a steel driving shoe that is driven into rock. After entrapped material is withdrawn, a 29-in. dia. socket is drilled about 6 ft. into the rock. A steel H-section—size depending upon the load to be carried—is set in the socket, then caisson is filled with concrete. Columns are placed 24½ ft. apart in the N-S direction and 60 ft. apart in the E-W direction.

Continuous steel girders carry floor loads.—Eng News-Rec, Ja 8, 83

RADIOACTIVITY FORMS OIL?

Bacterial action or energy from high-speed particles released by radioactivity is believed to convert protoplasm, proteins, fats, and other substances into crude oil. Paraffinic or straight-chain hydrocarbons can be produced in the laboratory by irradiating certain fatty acids with alpha particles or deuterons. Oleic acid, bombarded with deuterons from a cyclotron, made possible the isolation of 3% steric acid. Also, the unsaturated hydrocarbon heptadecene-8 was produced by the decomposition of oleic acid into this hydrocarbon and carbon dioxide.—Chem Eng, Ja, 266



FAST DIE OPERATION—Dies are closed and opened at rate of 750 ipm. by a hydraulic system on Wickes No. 4 automatic die caster, which has injection capacity of 100 cu. in. per cycle and makes up to 600 shots per hr. at 1,500-6,000 psi. Hydraulic system (above) has an accumulator system which supplies pressure to injection plunger, 4-way selector valves for knockout and manual operation of die actuating cylinder, and other parts. A direct-pressure system controls movements of die-actuating cylinder automatically. The piston moves the dies together at rapid traverse, slows as dies close, and locks dies at half rapid traverse. Cams on arm attached to piston rod operate limit switches which shift electrically operated valves in system. When die-closing toggles are locked, pressure rises. A pressure switch closes last limit switch.—Prod Eng, Ja, 102

TECHNICAL SHORTS

Standard pH Scale — National Bureau of Standards is sponsoring universal adoption of a single standard pH scale. Evaluated samples—potassium phthalate, potassium-dihydrogen phosphate, disodium hydrogen phosphate, and borax—have been made available. The pH has been derived from measurements of the electromotive force of the cells without liquid junction, in which they are used as electrolytes.—Eng News-Rec, Ja 8, 103

Freezes Lemon Juice—Lemon juice, sweetened with cane sugar to 50-55 deg. Balling, will retain flavor and will not curdle when frozen, according to the University of California. Diluted with 5-6 parts of water, the frozen juice makes a tasty lemonade. Freezing of juice will assist growers during time of seasonal surpluses.—Food Ind, Ja, W3

Double U-type Timber Support—Using double-U type supports for cross timbering, Ebensburg Coal Co. has lowered timbering costs, increased safety, and bettered clean-up by loading machines using less hand shoveling. Bent-down loop provides a socket for timber end. Support is of 1¼-in. stock. Ends are set in drill holes. Ebensburg uses 70-lb. rail, 18 ft. long, for timbering.—Coal Age, Ja, 94

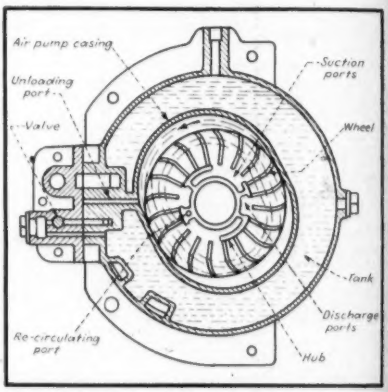
Nose Flap Aids in Ditching—Tests conducted by National Advisory Committee for Aeronautics show that the wartime-developed nose flaps keep the nose of the plane up during ditching. Normally in ditching, bomber nose digs into water, breaking fuselage. Lockheed P2V, Martin P4M, and Convoir P5Y now are fitted with the new flap.—Aviation Wk, D 29, 12

Chrome-plated Piston Rings — Top piston rings for trucks and buses soon may be chrome plated. These rings cost three to four times as much as regular ones, but last twice as long, thus reducing oil waste and costly teardowns. Chrome plating also is increasing wear of compressor and rock-drill parts.—Am Mach, Ja 15, 117

Separate Welding, Power Circuits—By using separate welding and power circuits, Delco Products Div., General Motors, has reduced maximum voltage at welders from 17 to 5%, reduced scrap from poor welding to 1%, and saved $1,050 per month by deenergizing 13,666 kva. of transformer capacity for a minimum of 40 hr. per week.—Factory, Ja 76

Hard-facing Keeps Blades Sharp—Medium-carbon steel blades on a sugar cane harvester remain sharp throughout a 90-day harvesting season as a result of hard-facing. Normally they would be dull in 2 days. The hard-facing is applied by the oxyacetylene process and is a filler rod of mild steel and fused tungsten-carbide particles.—Weld Eng, Ja, 53

Low-voltage House Heating—New development in electric house heating is a radiant floor system in which 125 amp. is circulated through ½-in. plough steel rope cable at 20 to 70 volts. The large cable avoids mechanical failures, is easily installed, and offers a large, low-temperature (110°F.) radiating surface. Floor temperature is 70-74°F. —Elec World, Ja 3, 39



FLUID PRIMER FOR PUMP—In Numarine automatic self-priming submersible centrifugal pump, the fluid primer (above) consists of elliptical casing with vane rotor revolving around a fixed hub without contact. Hub has four compartments, each with a port in periphery. Vanes revolve a ring of liquid which is held against casing by centrifugal force. Having side plates, vanes form small chambers, or "cylinders," opening into hub and passing alternate inlet and discharge ports twice each revolution. Since casing is elliptical, liquid ring reciprocates to act as a piston in each chamber to draw in and discharge air. Developed by Worthington-Simpson, Ltd., London, pump operates at depths up to 40 ft.—Prod Eng, Ja, 108

Converts White to Red Phosphorous—Continuous process for converting white phosphorous to red, developed by the Tennessee Valley Authority, reduces conversion time from days to hours. Liquid white phosphorous is kept at boiling point in a vessel for 1-6 hr., converting 30-50% to solid red phosphorous. Resulting slurry overflows into a heated screw which carries it countercurrent to hot, inert gases. The white phosphorous is vaporized and carried to a condenser to be recycled.—Chem Eng, Ja, 258

Cake Drying Cuts Shrinkage—Three major manufacturers of rayon—one a European manufacturer—are turning to high-frequency drying of rayon cakes. By the process, shrinkage is held to 0.4%; drying time is cut from 3-6 days to 30-60 min.—Textile World, Ja, 114

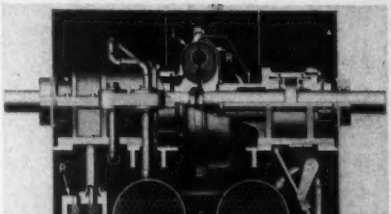
Automatic Siphon—Repriming is unnecessary with a siphon designed by E. A. Smith, Glogora Coal Co. Plunger ball, seated in upper end of siphon line, is lifted automatically when water rises within sump or basin. Float, attached to beam, lifts ball as water rises. As water falls, valve is closed proportionally.—Coal Age, Ja, 90

Statistical Quality Control—John Deere Tractor Co. is extending statistical quality control to incoming parts. With old methods, unsatisfactory parts often reached assembly lines, increasing production costs and causing delays. Items under statistical control give little trouble.—Am Mach, D 18, 98

Life on Bikini Goes On—Scientists report that plant and animal life on Bikini Atoll, scene of the 1946 atom bomb tests, is going on as usual. Slight radioactivity has been noted in some forms of waterlife but no large-scale changes have been seen. Animal reproduction is normal, with no strange mutation observed.—Pharm Int, F, 34

Lathe for Aluminum—For high-speed machining of aluminum, a new lathe runs at 3,000 rpm. and is driven by an 80-hp. motor. Cutting speeds range from 5,000 to 20,000 fpm.—Prod Eng, Ja, 158

200-ton Compaction—Weighing 40 tons empty, a special airport compactor is loaded with 160 tons of iron ingots to give a total compaction force of 200 tons. Built for the Baltimore, Md., airport by O. J. Porter & Co., the behemoth is pulled by a 200-hp. diesel and applies pressure of 9,600 psi. Four wheels have 60-ply tires 8 ft. high with 30-in. tread. Earth 4-6 ft. down feels the weight. Thus contractors believe they can omit one subbase layer of stone, saving $1,000,000.—Business Wk, D 27, 21



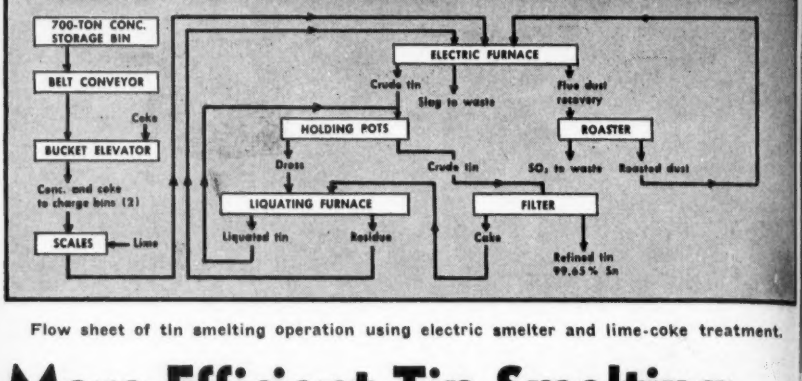
BETTER FEED-PUMP DRIVE—High-pressure boiler-feed system losses are reduced to a minimum with adjustable-speed fluid drives for 3,600-rpm. pumps. These hold correct boiler level automatically without throttling. Cross section through fluid drive is shown. R is runner; I, impeller; P, oil pump; C, oil cooler; S, speed controller. Pump has two identical vaned rotors, shaped like halves of grapefruit, and uses oil as power-transmission medium. One rotor connects to drive shaft, other to output shaft. Impeller pumps oil into runner, driving it like a turbine. A small pump transfers oil from pump to rotor and also reverses to withdraw oil to slow speed. Efficiency is 96-97% at full load.—Power, Ja, 74

Coffee Cattle Feed—Waste pulp of the coffee bean has been made into a corn-substitute milk cow feed. Tests at Centro Nacional de Agronomia in El Salvador have shown that it can be substituted, pound for pound, for corn. Available pulp in Western Hemisphere would equal 34,000,000 bu. of corn if converted by the relatively simple process.—Food Ind, Ja, 136

Heavy Spot Welding—Three-phase spot welding has made notable advances in the structural steel field. Thicknesses of metal up to ⅝ in. can be welded, and scaly steel can be handled without precleaning or pickling.—Weld Eng, Ja, 79

Revolution in Gears—Extrusion of gear blanks with the teeth formed in them is a revolutionary production process now in the development stage. Only a finishing cut is required to complete the toothed periphery.—Am Mach, Ja 1, 65

One-trip Beer Bottles—Acme Brewing Co. has introduced beer in lightweight nonreturnable, no-deposit bottles and is packaging 12 bottles in a convenient carry-home carton to boost sales.—Food Ind, Ja, 129



Flow sheet of tin smelting operation using electric smelter and lime-coke treatment.

More Efficient Tin Smelting

Metal comparable to standard tin is produced in one operation by electric smelter and lime-coke treatment. Iron is filtered out

By lime-coke treatment of the concentrate, a metal comparable to standard tin is produced in one operation, without electrolytic refining, at Consolidated Mining and Smelting Co. of Canada, Ltd. Tin concentrate is reduced to metallic tin in three steps: (1) smelting in an electric furnace, (2) refining the crude tin, and (3) dross treatment. No slag treatment is necessary, as slag has low tin content.

The reduction furnace is an oval-shaped, 400-kva., three-phase, electric unit, 9 x 6 x 6 ft. high. Power is supplied at 90 volts, 3,000 amp. through three 8-in. graphite electrodes. Furnace charge is 800 lb. tin concentrate, 175 lb. roasted flue dust, 100 lb. liquated residue, 130 lb. coke, and 10 lb. limestone. The concentrate is reduced with minus-4-mesh breeze coke so as not to slow the smelting rate.

Cycle of operation is about 30–33 hr. Thirteen charges are fed to the furnace, one each hour, before first crude tin is tapped. Another tap is made after the 22nd charge. The complete charge is made up of 27 to 31 charges. Reduction of tin continues until the slag assays less than 4.5% tin, which normally requires about 4 hr. Slag is tapped first, then tin.

Crude tin flows via a brick-lined launder into holding pot No. 1. After temperature drops to 700°F., tin is drossed and pumped to holding pot No. 2. When enough has accumulated, it is pumped at as low a temperature as possible through a filter for additional refining. Filtrate of refined tin goes to pot No. 3. The pots, of cast iron, rest in brick settings and are heated by coal-fired furnaces.

Iron is quite soluble in tin at high temperatures but separates on cooling as a solid component, $FeSn_2$ (containing about 19% iron), suspended in virtually iron-free tin. By filtering, the solid $FeSn_2$ is removed and the iron content of the crude tin lowered to 0.005%.

The patented filter consists of a bell-shaped pressure chamber with connections to a centrifugal pump and compressed air; perforated steel plate covered with asbestos cloth; and a conical filtrate basin discharging into a casting

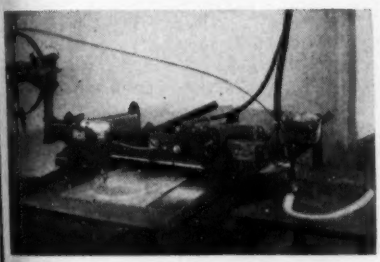
pot. Filter cake, containing 80% tin and 9.5% iron, is liquated with the dross. Close control of filtering temperature is essential.—Eng & Min J, Ja, 60

SUBMERGED-MELT WELDING MADE MORE VERSATILE

Important advances have been made in automatic submerged-melt welding. A complete line of hard-facing electrodes has been developed. When hard-facing can be done automatically, it becomes a production process that manufacturers of farm and construction equipment can use to protect their machines against wear.

To enable manual submerged-melt welding to be done at speeds normally accomplished by automatic means, a new welding head has been developed. It is small and light enough to hold. It feeds the welding wire automatically from a reel. It has a container to carry the granular flux. Feed and arc length are automatic, but speed and direction are not. The welder can determine the size of bead and its location.

Mechanized shape welding now can be done by the submerged-melt process, the direction of the weld being changed to follow prescribed outlines as the welding action proceeds. The carriage movement can be controlled by such means as guide wheels, radius rod, eccentric pin, and template-following machine.—Weld Eng, Ja, 36



Special shapes now are submerged-melt welded by using a template to guide welding head, as in flame-cutting.

MASTER ANTENNAS SOLVE TELEVISION PROBLEM

Apartment house owners have objected to the erection of individual television antennas by tenants, impeding the sale of television receivers to millions in large cities. To meet the situation, installations of Intra-Video Television and FM Master Antenna Systems are being made. These master antennas permit all receivers in an apartment building to operate from a single antenna array. Tenants are proportionally charged for installations of Intra-Video Television and FM as against individual antennas.

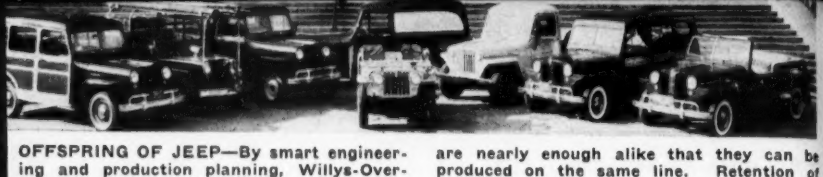
The system comprises a directional antenna for each broadcast station, a pretuned amplifier, and the distribution network. Flexible, low-loss coaxial cables are used, these being screened against interference.—Elec C & M, Ja, 54

BUDGETARY CONTROLS SAVE

Budgetary controls should be used by industrial distributors to reveal the exact status of profits at any point during the fiscal year. In using the system, management can shift its budget to meet shifting business conditions. In general, the system makes it possible for the owner to guide his business to a satisfactory profit by controlling and reducing operating expenses, acting when market conditions change, coordinating all effort toward increased efficiency, and promoting employee confidence.—Mill Supp, Ja, 81

PLANE DOCKS CUT COSTS

Use of docks for airplane maintenance produce savings in work and money, since they keep man and tools close together. A study of cleaning, polishing, and major overhaul of 43 DC-4's and 50 DC-6's shows a possible saving of over $1,000,000 through use of docks. A complete dock and tools cost about $40,000. —Air Trans, Ja, 29



OFFSPRING OF JEEP—By smart engineering and production planning, Willys-Overland has converted its military Jeep into a line of utility cars and trucks with standard, interchangeable assemblies. Eight models have no more than three types of components. Extensive interchangeability of entire subassemblies increases manufacturing quantities and slashes tooling, production, assembly, and service costs. Engines for all are nearly enough alike that they can be produced on the same line. Retention of the Jeep "look" and production for a previously overlooked utility market avoid expensive year-to-year model changes. Shown here are the civilian Jeep (center) and its derivatives (l. to r.): station wagon, fire truck, two-wheel-drive truck, panel delivery truck, four-wheel-drive truck, station sedan, and Jeepster.—Am Mach, Ja 1, 69

ROSIN AND TERPENE OILS FROM PINE STUMPS

Rosin and terpene oils are produced from long-leaf yellow pine stumps by an adsorption-process developed by Crosby Chemicals, Inc. The new unit permits the manufacture of a number of pale wood rosins corresponding in color to the gum rosin types.

Stumps are washed, ground, shredded, and screened. In the extractor house, the material is dumped into 15-ton steel extractors. Ten of the 16 extractors are operated simultaneously in series, extraction with naphtha taking place at 265–280° F. and 65–85 psia. Spent chips are used as fuel.

Leaving the extractors, the crude solution of rosin and terpene oils goes to the refinery and still house. Solvent is recovered in two vertical-tube atmospheric-pressure evaporators in parallel. Remainder is removed in a flash tower under 15-in. Hg vacuum. In two finishing towers, steam strips terpene oils from rosin under 27-in. vacuum. Water is separated from oils, and they are washed with 20% caustic, then fractionated in batch stills to terpentine, pine oil, and other components. Primary distillates are fractionated in the same stills into terpene specialties. Pine oil roots from still bottoms go to other processors.

Still molten rosin is diluted with naphtha to 50% solution in four mixing tanks, pumped into six wash tanks, further diluted to 15%, and sprayed with water to wash down color bodies. Nigre, a heavy, dark resin, is withdrawn periodically from bottoms of wash tanks. Rosin-naphtha solution is next pumped into the pale plant, where final color reduction is accomplished by adsorption on magnesium trisilicate packed in adsorption towers.

Pale rosin solution goes into two vertical tube evaporators connected in series for naphtha recovery, the second one operating under 15-in. vacuum. A final fractionator recovers terpene oil traces from the rosin.

The plant can make such terpene specialties as turpentine, alpha pinene, dipentene, pine oil, and alpha terpineol, plus a variety of grades of refined wood rosin.—Chem Eng, D, 119

UNIQUE SEMICONDUCTORS

Resistivity and temperature coefficient of resistance can be controlled by composition and processing of resistors made of sintered ceramic-metal compounds. Research reveals that resistors can be made with various characteristics, possibly with zero temperature coefficient. Resistances result from both the contact between particles and resistance within individual particles.

Since their resistivities fall in the range of 10^{-2} to 10^{6} ohm-cm., the materials may be classed as semi-conductors.—Electronics, Ja, 138

SCREENING SYSTEM BUILDS GOOD SALES FORCE

Scientific selection has enabled Pennsylvania Power & Light Co. to build a high-grade sales organization of 200 men in 2 yr. The selection procedure invloves four screening operations. First is a brief preliminary interview to eliminate the obviously unfit. Second is a weighted application form designed to exclude those with little chance for success. This form considers seven items: (1) age, (2) number of dependents, (3) number of jobs in last 5 yr., (4) time unemployed in last 5 yr., (5) employment status at time of application, (6) marital status, and (7) possession of savings and investments. Each item is weighted.

Third is a telephone or personal check with two or three previous employers to obtain their appraisal of a man and to check his statements. Telephone or personal checks obtain a more honest appraisal than a written report.

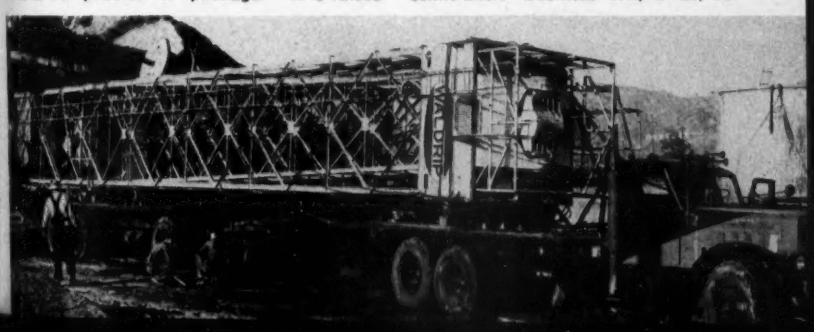
Fourth, a patterned interview is held. This is designed to provide a complete picture of applicant's suitability. The interview is strictly private, is informal and friendly, and its purpose is to extract as much information from applicant as possible. The questions are printed and the answers recorded on a form. Content and order of questions are designed to get the applicant to talk about himself. The form covers applicant's work record since high school; what he did in spare time; amount of schooling; family background; financial status; domestic and social situation; and health.

From the answers the interviewer can form a well-rounded opinion of the applicant. Successful sales people must have nine basic traits: motivation, maturity, leadership, stability, ambition, industry, perseverance, loyalty, and ability to get along with others.—Elec World, Ja 3, 43

AFFECT CRACKER QUALITY

Food manufacturers are becoming increasingly conscious of the undesirable effect of trace metals and nonpathogenic bacteria on food quality. Even in soda crackers, these agents cause wide pH variation and result in crackers of soapy, mealy flavor, dull or scorched appearance, and high density. Undesirable bacterial fermentation is caused by variation in the microbiological condition of the fermentation troughs. Metal cations, especially iron, activitate oxidation-reduction enzyme systems which effect protein in dough. Variations in pH increase during baking also are caused by interaction between sodium ion and protein and by a pH above 6.5 in dough at the brake.—Food Ind, Ja, 102

MORE OIL AT LOWER COST—To cut drilling costs, Shell Oil Co. engineers designed this 123-ft. telescoping oil derrick which fits into a compact 63-ft. "package." It is raised by electrically driven hydraulic rams. Power plant is three 12-cyl. gasoline engines and generators. Draw-works is mounted on the semitrailer.—Business Wk, D 27, 38



ION-EXCHANGER WATER REMOVES BOILER SCALE

Uninhibited 0.01 to 0.03% acid has been found very effective in dissolving and disintegrating adhering boiler and superheater deposits. Easily prepared by passing a normal water through hydrogen-zeolite softeners, the acid is not strong enough to substantially attack the boiler metal during cleaning. Southern California Gas Co. has used the effluent from such a softener for cleaning separately fired superheaters and several boilers.

When regenerated with sulphuric acid, hydrogen zeolite removes calcium, magnesium, and sodium cations from water, replacing them with hydrogen. The softener effluent then contains hydrochloric, sulphuric, and carbonic acids in proportion to the chlorides, sulphates, and carbonates in the raw water.

At cost of 1½¢ per lb. of H_2SO_4, chemical cost for hydrogen-zeolite water softener operation was 10¢ per 1,000 gal. of water, or a total acid cost of 80¢ for one superheater cleaning. Considering equipment cost, etc., expense was $1.60, plus labor of piping to and from superheater. —Power, Ja, 99

NEW NONCORROSIVE ALLOY CAN BE SHAPED, FORMED

Carpenter Steel Co., working Duriron Co.'s noncorrosive stainless steel alloy, has developed a process by which the alloy can be shaped, welded, or formed. Previously, Duriron alloy could be cast only. The new process will permit the alloy to be processed into hot-rolled, cold-drawn bars, cold-drawn shapes, and cold-rolled strips. Sheets are now being produced; plates will be produced in the near future.

Although details of the process have not been announced, presumably Carpenter Co. has developed processes for treating billets to change the relative stiffness of the casting alloy into a pliant alloy capable of being shaped to desired form. The alloy contains 29% nickel, 20% chromium, 3% copper, 2% molybdenum, 0.07% carbon, and traces of silicon and mangenese. Copper is a solution and is not present as a free element.

The alloy may be used in equipment handling sulphuric acid, ammonium fluoride, brines, fatty acids, hydrofluoric acid, pickling liquors, lactic acid, tanning liquors, vinegar, and nitric acid. It should not be used where wet bromide, wet iodine, fluorine gas, ferric chloride, muriatic acid, or hydrochloric acid are present. It will cost 4 or 5 times as much as standard stainless steels, but savings in equipment replacement, labor, and downtime are expected to offset the added cost.—Business Wk, Ja 17, 62

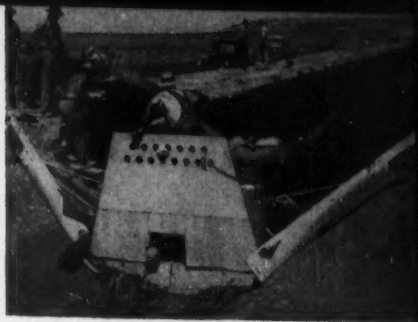
SMALL SELSYN PICK-OFF RECORDS FLIGHT DATA

Small remote recorder, designed by General Electric Co. complies with the CAB regulation requiring 2-channel flight records of all domestic schedule flights. The rotor of the 1-in. dia. selsyn is coupled to instrument pointer by means of a small fork straddling the pointer. Static breakaway torque required by the selsyn is 0.0002-oz.-in. Primary winding of the selsyn transmitter is excited by a 400-cycle, ac. power source.

Signal from secondary winding of the transmitter is supplied to a similar toroid winding in the selsyn follow-up. Rotor of the follow-up is coupled to the recording stylus. If a difference exists between the instrument reading and value being recorded, selsyn follow-up transmits an ac. signal to a 3-stage vacuum tube amplifier. This signal is applied to one winding of a 2-phase, low-inertia ac.-recording motor whose other winding is constantly excited from the 400-cycle source. This drives the recording stylus of the instrument.

A pressure sensitive black paper coated with white laquer is cut by the stylus, forming a 0.010-in. wide record.—Aviation Wk, Ja 12, 21

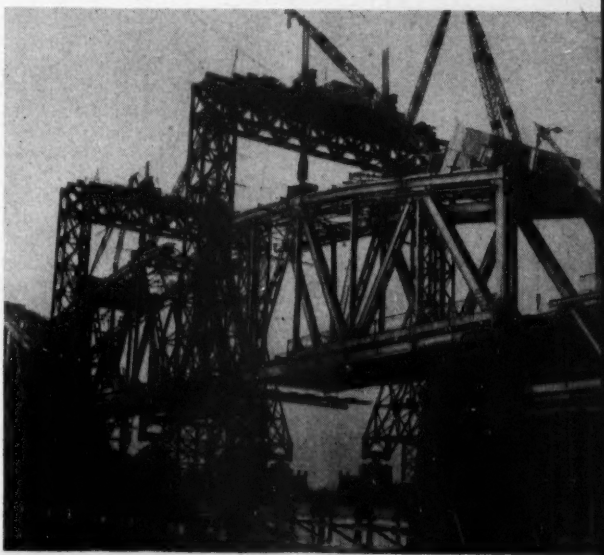
MAKES SLAB-SETTING EASY—To set stone facing on 6-story hospital, Charles H. Tompkins Co. suspended the scaffold and chain hoist from a monorail. Scaffold and hoist roll easily.—Cons Meth, Ja, 107



ASPHALT PAVER LINES CANALS—Asphaltic concrete lining requiring no seal coat was applied to lateral canals in Columbia Basin. Paver, pulled by gas winch, rides on pan 8 ft. long and shaped to canal section Behind pan is a strikeoff and heated screed. Trimmer blades shown were replaced by a pan of stabilizers riding berm. An 8-man crew placed up to 3,000 sq. yd. of lining in 8 hr.—Cons Meth, Ja, 86

New Methods in Construction

RAISE RHINE BRIDGE — Useful in building new bridges as well as for salvaging wrecked ones, portal frame erection equipment easily raised sections of Baerl railroad bridge over the Rhine, Germany, back into place. Two portal frames, or gantries, lifted the two halves of the broken span, the halves rotating at the pier ends about special supports. Portal frames moved lengthwise, to keep lifting bars vertical. Pile-pipe falsework carried the portal frame runway girders. The frames were mounted on railroad trucks, and the hydraulic lifting apparatus atop frames was on movable carriage for adjustments. — Cons Meth, Ja, 92

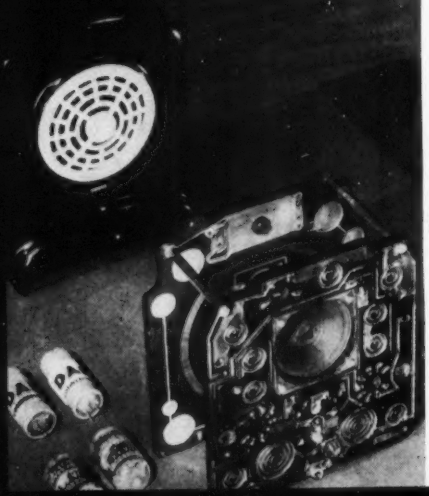


MACHINE-MADE RADIO PRODUCED IN ENGLAND

Forerunner of more ambitious superheterodyne models to come, a machine-made radio has been produced in England by John Sargrove, Ltd. It employs two twin-tetrodes in a regenerative circuit for the broadcast band. Two plastic panels having preformed depressions and holes are fed into automatic electronically controlled machines, where they are successively sand-blasted and sprayed with zinc. Moving through the machine on a conveyor belt, the panels are face-milled so that the zinc remains only in depressions to form wiring, inductances, and capacitors. Resistances are added by spraying on graphite as the panels continue through the machine. As the panels near the end of the line, tube and filter-capacitor sockets and some small hardware are automatically installed.

When the panels emerge from the machines, little remains to be done by hand labor but bolt them together, install the loud speaker, plug in the two filter capacitors and two tubes, test, and place the chassis in the cabinet.—Electronics, F, 136

Radio made by automatic machines.



MODERN ASSEMBLY LINE FLOATS BOATS OFF 2 A DAY

Straight-line production methods, plus prefabrication of subassemblies, has been applied by Owens Yacht Co., Ltd., to 27- and 33-ft. boats. Currently, two boats a day float off the assembly line, but addition of two more lines will bring production to one per hr. in 1948. Straight-line assembly and subassembly prefabrication have already lowered costs. Hulls move down lines on 4-wheeled trucks on rails.

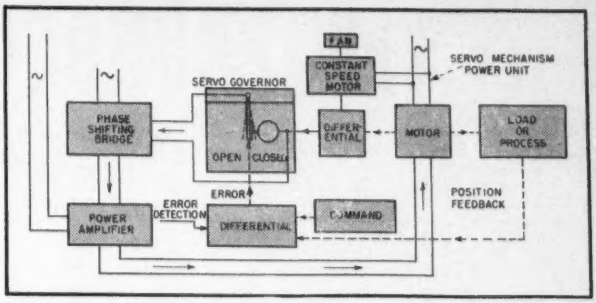
Hull frames are fabricated upside down and continue in this position through initial production stages. With this method of construction, hull assembly can be framed on a permanent jig built on floor and lifted off by crane; jig can be so arranged that hull frame can be built around clamps, bulkheads, and deck; inverted hull is easier to work on, especially during planking.

Boat ribs are steam-bent into place before boat leaves framing jig. Next preformed planks are added, all planks being pattern-cut. Then bottom is sanded, calked, puttied, and painted. Hull is now turned and placed on truck. Engine is put in place and prefabricated cabin placed on hull.

Boats are launched indoors for water tests. They are then removed from tanks and stored indoors on trailers until sold. —Factory, Ja, 72

CUTS CERAMIC BAKE TIME

An emulsion of wax in water replaces the starch usually used to fill pores of chinaware before baking in the new Socony-Vacuum Oil Co. process. Only one firing is needed in the new process, saving fuel and manufacturing time. —Business Wk, Ja 17, 32



Schematic diagram of the Motron packaged servomechanism is shown.

GENERAL-USE SERVO

Various industrial process units—such as paper winder, milling machines, oil blenders, and blowers—can be controlled automatically and accurately by the Motron packaged servomechanism. Such devices usually have to be designed for a particular application. The motor speed and direction are controlled by a governor, and the output of the motor is made to move the governor control by way of the process so that the control approaches zero position when the output shaft approaches the desired position.

The motor drives a unit which changes a process variable (blower for air velocity), while the factor being controlled operates the governor control through a sensing device. Motor speed is proportional to the displacement of controlled variable. The design is conductive to accuracy.—Electronics, Ja, 100

LOADER WORKS THIN SEAMS

Using a rubber-tired loading machine in a 36- to 48-in. seam, Ebensburg Coal Co. mined two 250-ft. rooms in three weeks, averaging 23.6 tons per shift per face man. Company's mining plan consists of driving 25-ft. rooms 250 ft. deep on 45-ft. centers and taking practically all of the 15-ft. pillars on the retreat.

Loader has four swiveling wheels. For operation, end of the loading boom extending over conveyor is supported on a hydraulic jack engaging the roof and floor. Rear wheels are retracted and front wheels swiveled 90 deg. in opposite directions so front end can be swung in an arc.

Crew consists of a loading machine operator and helper, a cutter and helper, a shot firer, and a "panner up."—Coal Age, Ja, 80

NEW FOR YOUR CAR

New Automotive devices recently developed for your car include: a brake control which operates electromagnetically to prevent rolling on grades or creep on level stretches. Unit fits immediately behind master brake cylinder; it is deactivated by switch on the gear-shift lever. It is a development of Electrol, Inc. . . . An electric throttle holder, engineered by Maco Corp., holds throttle at a constant speed and is released whenever brake or accelerator is used. . . . Two 4½-in. coils mounted on bottom edge of front and rear fenders sound warning buzzer in car when curb is touched, preventing damage to fenders in parking. Coils are a development of WSW Mfg Co.—Business Wk, D 27, 46

Wix Accessories Corp. under-car lamp produces a 40-ft. dia. circle of light to lessen danger of side-swiping while parked. Frame is metal, lens plastic.—Am Auto, Ja, 142

NEW PRODUCTS

Heat-resistant Rubber—Resembling natural pale crepe rubber, a new rubber developed by B. F. Goodrich Chemical Co., made in both dry and latex forms, is little damaged by heat or oil. Vulcanized, it can be used as gaskets, beltings, and oil seals; unvulcanized, it can be used as an adhesive, coating, or impregnant for textile and paper. It can be compounded or extruded. Heated to 400°F. for 8 hr., it showed no loss of properties.—Business Wk, Ja 10, 64

Double-duty Screw Machine—Work spindle and threading spindle rotate in the same direction at different speeds in Brown & Sharpe Mfg. Co.'s new automatic screw-threading machine. The difference in speeds permits the die or tap to cut at required speed, while the work rotates at sufficient speed for turning or other operations. Small screws, nuts, and bushings are produced at unusually high rate.—Am Mach, Ja 1, 130

Simple Dewpoint Recorder—Sensitive element in new dewpoint recorder consists of a thermal bulb wrapped with a saline-saturated woven-glass tape and two windings of silver wire to conduct heating current. Variable heat supply brings element to equilibrium temperature at which the solution neither absorbs nor gives up moisture to atmosphere. The temperature is measured by a thermal bulb and recorded on a chart to indicate dewpoint temperature. Foxboro Co. developed the instrument.—Power, Ja, 120

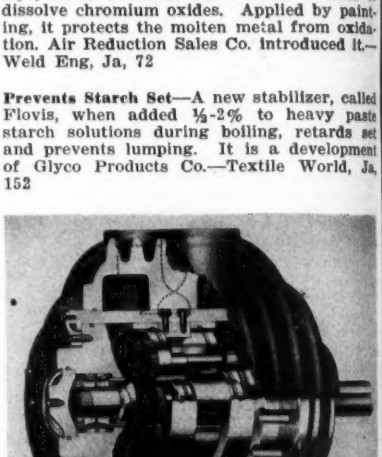
Alloy Heavier Than Lead—Using tungsten, copper, and nickel, General Electric Co. has developed a new alloy that is 50% heavier than lead. Called G-E Hevimet, it is designed for use as a high-density material on a gamma ray screen, but also will serve as a balance weight on rotating parts. It is a sintered material, but it can be made up into complex shapes by hydrogen welding. Density is about 17 grams per cc.; tensile strength, 85,000-118,000-psi.; Rockwell "C" hardness, 30-40.—Eng & Min J, Ja, 98

Road Slab Joint—For road 12 ft. wide, a new road slab joint, developed by Bethlehem Steel Co., Inc., is lightweight, rigid, and easily installed. Alternate dowels are welded to one side of frame and one center wire, remaining dowels being welded to opposite side and second wire. Halves are drawn apart easily for insertion of filler. Unit weighs 84 lb.—Eng News-Rec, Ja 8, 126

Glass-plastic Grille—Made of a mixture of unwoven plastics and Fiberglas, the new Synspun radio-grille material is self-supporting, yet 70% porous. It is produced in colors and metallic finishes by Polyplastex United, Inc.—Electronics, Ja, 142

Stainless Flux—Compounded for gas welding of stainless steels and high-chromium alloys, Airco Formula No. 34 flux is said to dissolve chromium oxides. Applied by painting, it protects the molten metal from oxidation. Air Reduction Sales Co. introduced it.—Weld Eng, Ja, 72

Prevents Starch Set—A new stabilizer, called Flovis, when added ½-2% to heavy paste starch solutions during boiling, retards set and prevents lumping. It is a development of Glyco Products Co.—Textile World, Ja, 152



REVERSIBLE HYDRAULIC PUMP—Rotor assembly of new nonpulsating, reversible hydraulic pump carries four equally spaced impeller vanes geared together in a two-to-one ratio. Each pair of diametrically opposed vanes forms two closed compartments per rotating cycle. Fixed clearances between chamber wall and rotor, in conjunction with liquid being pumped, provide capillary sealing between high- and low-pressure areas in working chamber. All operating parts are in hydraulic and dynamic balance, and efficiencies of 85-90% are claimed for this Rockwell Mfg. Co. pump.—Prod Eng, Ja, 166

Checks Metal Content—Purity of metals, percentages of alloy content, or quantities of metallic elements dispersed in metallic carriers can be checked with an x-ray diffraction technique using a Geiger-counter fluorescent analysis unit. It checks elements from atomic No. 20-41 when rock salt crystal is used, No. 42-50 with calcium fluoride crystal. The North American Philips Co. unit permits rapid analysis without damage to the specimen.—Chem Eng, Ja, 154

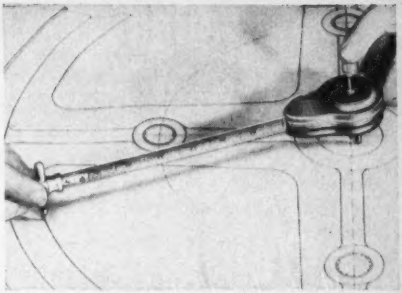
Fountain Trowel—To speed plastering and eliminate hod and hawk work, James A. Hicks, contractor, developed a fountain trowel. Plaster flows from mixing tanks through hose to slotted trowel. Mounted on rollers, tanks are equipped with revolving paddles, air compressor, and gasoline engine. —Cons Meth, Ja, 106

Steps Cord Twist—A new safety swivel keeps electrical cords from twisting. Swivel is attached at end of the cord inside the plug or directly to appliance not having a plug. Made in two sleeve-type sections fitted inside each other, the inner and outer sleeves have contacts at each end held in place by springs. This assures even flow of current. Unit is made by Burlington Instrument Co. for 125-volt, 10-amp. capacities.—Business Wk, Ja 10, 64

Electronic Lathe—Contributing largely to the high efficiency of a new Monarch lathe are electronically controlled feed motors. One is used for longitudinal (0.5-20 rpm.), one for cross feed (1-40 rpm.) on front carriage. Another controls rear carriage cross feed. Infinitely variable feed ranges, fast outfeed, and practically constant feed are provided. Longitudinal traverse is at 80 rpm. Control is by pushbutton; cycle is automatic.—Electronics, Ja, 132

Fiberglas Seat Filler—Inexpensive, light, resilient, and noncombustible the new Owens-Corning Fiberglas Corp. seat-cushion filler for buses, automobiles, or planes is formed from 0.00011-in. dia. fibers. Fibers are treated with a resin binder to form blankets of ½-lb. density, 1-in. thick. In plane seat, where weight-saving is important, savings of up to ½ lb. per seat can be obtained from this filler.—Bus Trans, Ja, 186

Reines Used Oil—Low-cost catalyst and filter in the new Holden Co. portable, industrial oil refiner saves user 90% in lubricating bills. Dirt, carbon, sludge, abrasives, and particles of metal are removed in 20 min., as well as gasoline, kerosene, sulphuric acid, and water. Cost runs 20¢ per gal. of reclaimed oil; unit handles 3½ gal. per batch, 90 gal. per day.—Mill Supp, Ja, 14



RETRACTABLE COMPASS—For draftsmen and engineers, this beam compass can be set quickly to any radius up to 72 in. Flexible-rigid tape is locked in any position by a brake lever. When brake is released, tape retracts into small die-cast case. Standard drafting pencil or steel scriber is held in the head. Omicron Co. developed the instrument. —Prod Eng, Ja, 174

Automatic Flame-hardening — Fully automatic except for loading, the new pushbutton Flamatic flame-hardening machine heats parts on rapidly rotating spindle and drops them into an oil quench. Electronic control holds temperature within ±5°F. Heat is confined to surface of part, permitting core properties to be established by previous heat treatment. Distortion is negligible. Cincinnati Milling Machine Co. developed the unit. —Weld Eng, Ja, 72

Lays Material All One Way—Flat-folded or rolled materials can be laid in both directions on the table with face of material all in one direction by a trailer attachement developed for their cloth spreaders by C.R.A. Corp. No rethreading is necessary. It can lay goods either face-to-face or face all one way.—Textile World, Ja, 148

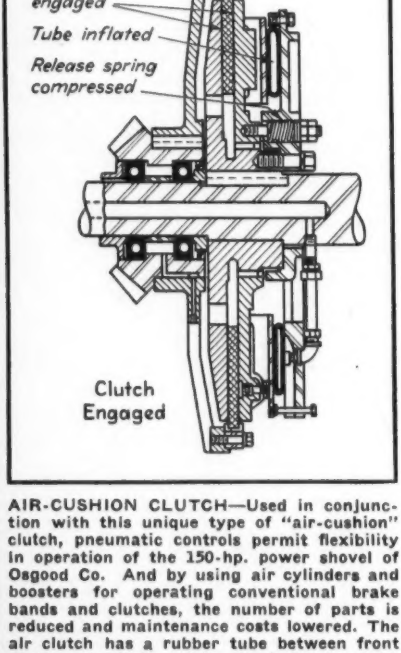
Cuts Belting Cleanly—Belts up to 60 in. wide are cut cleanly and squarely with the new Flexible Steel Lacing Co. cutter. Base is squared with belting, then nailed to it. Cutter moves across base, cutting belt in ⅛-in. bites. Units are made for belts 24-, 36-, 48-, and 60-in. wide.—Coal Age, Ja, 154

Continuous Mixer — Designed to eliminate batch mixing in the process industries, the new Roto-Feed continuously mixes products from water to bread dough at controlled rate of 5 to 1,000 gal. per hr. Ingredients are proportioned into this Marco Co. machine. —Food Ind, Ja, 176

NEW PRODUCTS

2100°F. Metal—Retaining its strength and corrosion resistance at temperatures as high as 2100°F., the new Grade K138 Kennametal consists of titanium carbide with cobalt as a bonding element. It was developed for high-temperature structures, such as furnace parts, by Kennametal, Inc.—Am Mach, Ja 1, 144

Nondirectional Antenna—Designed for television and f-m broadcast reception, a new horizontally polarized, S-shape, antenna developed by Technical Appliance Corp. is essentially nondirectional.—Electronics, F 196



AIR-CUSHION CLUTCH—Used in conjunction with this unique type of "air-cushion" clutch, pneumatic controls permit flexibility in operation of the 150-hp. power shovel of Osgood Co. And by using air cylinders and boosters for operating conventional brake bands and clutches, the number of parts is reduced and maintenance costs lowered. The air clutch has a rubber tube between front plate and friction plate. It is operated by admitting air to the tube to clamp friction disk between floating plate and back plate. Pressure on plates is proportional to pressure of air admitted. Springs release the clutch.—Prod Eng, Ja, 96

Solder Feeder—Clamping onto any standard electric soldering iron, the Solder-Matic attachment feeds solder at the touch of a fingertip, freeing one hand to manipulate parts. Developed by Nelpin Mfg. Co., it handles 1/16-3/16-in. solder wire and feeds up to 3/16-in. per stroke.—Oper Eng, Ja, 72

Large Area Steel Filters—A new butt-welding technique is used by Micro Metallic Corp. to produce porous stainless steel filter sheets of any required area. Sheets 6x18 in. are joined by a modified Heliarc welding process, suitable for filter materials 0.10 in. or more in thickness. The welded sheets can be sheared, drilled, or machined, and within limits can be rolled or drawn. The company also welds porous materials to solid stainless steel members.—Chem Eng, Ja, 154

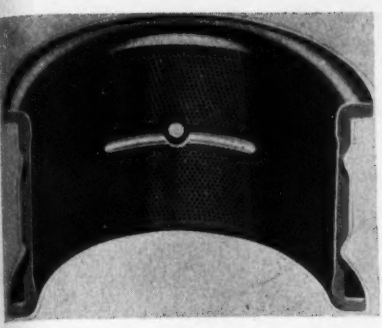
Cools Sewing Machine—A small blower with a built-in motor and mounting brackets cools needle of industrial sewing machines. Benefits: thread and needle saving, increased machine speed, stronger seams, and fewer skipped stitches. Air delivery hoses are available for different style machines. Device was developed by Union Special Machine Co.—Textile World, Ja, 146

Miniature Speed Changers—For increasing or decreasing the speed of small power devices such as instruments, controls, experimental work, and models, Metron Instrument Co. has developed small speed- changers. Overall length is 2 11/16 in.; body diameter, 1 1/16 in. Several gear ratios are available. —Elec World, Ja 17, 204

Cuts Hose Chafing—Spring-tension mounting clips hold hose or duct free from bulkhead aperture, eliminating chafing of the hose or duct. It is made of cold-drawn music wire, shaped into a circle, with four sets of grippers at quarter-points to fit on aperture edges. It is a development of Pepka Spring Co.—Aviation Wk, Ja 5, 29

Fast Package Former—From 75 to 90 lined cartons per minute are set up by Battle Creek Bread Wrapping Machine Co.'s new Model 100. It automatically feeds out a flat carton, forms an inner liner, seals sides and bottom of liner and carton, then places finished carton upright on a conveyor, ready for filling.—Food Ind, Ja, 174

Automatic Pavers — Hydrocycle control, which combines timing of batch with timing of complete paving cycle, is included in two new pavers introduced by Chain-Belt Co. The control automatically starts discharge, starts skip, turns water on and off, closes discharge chute, and operates transfer on double-drum design.—Cons Meth, Ja, 116



GRIDDED BEARINGS—New heavy-duty, high-speed bearings for diesel engines and heavy machinery consist of a centrifugally cast lead-bronze shell having a precision-gridded inner surface filled with silver babbitt. A run-in surface of lead-tin alloy 0.002 in. thick is electroplated to the bore. The bearing operates under loads of more than 3,500 psi. projected area with shafts as low as 160 Brinell hardness. American Brake Shoe Co. developed it.—Power, Ja, 122

Emulsifies Yeast—Unsanitary and inefficient bucket handling of emulsified years is eliminated by Yeast Emulsifier Co.'s new unit. It mixes metered water, yeast, vitamins, and admixes, and emulsion is piped directly to dough mixer. The yeast is distributed throughout the total amount of water for each mix.—Food Ind, Ja, 168

Glass-plastic "Lumber"—Of laminated glass and plastic, Prest-glass, a new building material, can be nailed or stapled without cracking. It fits easily to curved surfaces, will snap back to original position after bending and distortion. Noncombustible and mildew and rot resistant, it is not affected by temperatures ranging from —100 to 350°F. It is available in 8-ft. high sections of varying widths in 15 dull or glossy color finishes. Prest-glass, Inc., developed it.—Business Wk, Ja 3, 34

Variable-pitch Sheave—Pitch diameters from 1.9 to 4.7 in. are possible with a new steel, fractional-hp., variable-pitch sheave, adjustment being provided by 20 threads. In three standard bore sizes—½, ⅝, and ¾ in.—all have positive locking devices. The ½-in. bore sheave has a setscrew only, while the ⅝- and ¾-in. models have both keyway and setscrew. Sheaves are a development of Dodge Mfg. Co.—Factory, Ja, 136

Plane Fire Detector—Working at preset temperature, a new plane fire detector actuates an alarm signal under allowable 5 sec. when exposed to 2000°F. direct flame. False alarms cannot occur. Use of welding eliminates many moving parts; moving parts and contact points are enclosed to protect them from dirt and corrosion. The Control Products, Inc., development is 2 13/16-in. long; ⅜-in. in dia.; weighs 1 oz.—Aviation Wk, Ja 5, 29

Heavy-duty Lubricating Oil—Full detergency and full, tough paraffin base qualities are combined in Gulf Oil Corp.'s new Gulflube H. D. oil for diesel engines in heavy-duty operations. Anti-foam agent prevents crankcase foaming under high temperatures or speeds.—Eng News-Rec, Ja 8, 123

No-draft Ventilator—Made of steel venetian-blind slats with baked enamel finish, Associated Venetian Blind Co.'s new no-draft ventilators are available in 18-46-in. widths. Reversing ventilator in window frame permits either upward or downward air current. It can be installed either in a permanent or temporary position.—Elec Merch, Ja 1, 246

Combination Hoist, Jack — A combination hoist and jack, designed in three pieces, can move loads up to 2,000 lb. in shops, mines, or fields. It uses a rachet-and-pawl hoisting mechanism to reduce moving parts. Safety handle bends before parts break from overload. It is a Caffing Hoist Co. development.—Coal Age, Ja, 146

Automatic Oscillograph—As many as 12 quantities can be recorded at once, and 100 transients can be handled, by the Type RS-9 automatic oscillograph introduced by Hathaway Instrument Co. It is designed to meet every need of a control station engineer for recording faults or for staged system testing. The instrument is suitable for remote, unattended operation.—Electronics, Ja, 140

Variable-blow Scaler—Graduated control in throttle of scaling hammer developed by Rotor Tool Co. gives a choice of blows. Exhaust from the pneumatic tool cleans away loosened chips and scale.—Am Mach, Ja 15, 146

FREE SERVICE TO READERS

As a special service to our subscribers, McGraw-Hill Digest will furnish, without any charge, additional information about any new product or technical development described. Address your letter to: The Editor, McGraw-Hill Digest, 330 West 42nd St., New York 18, N. Y., U. S. A. —*THE EDITORS*

Buick's Torque-Converter

Engineers follow trend to fluid couplings but add extra elements which automatically give high torque at low speeds. Planetary unit permits control by driver

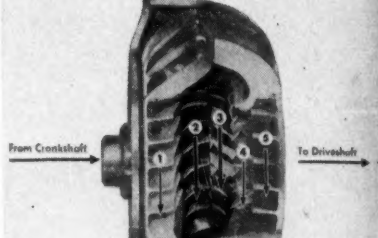
A fluid coupling, eliminating both the clutch and the gear-shift lever, has been built into the 1948 Series 70 Buick Roadmaster. Trend in American automobile design has been toward the elimination of gear shifts through application of the fluid couplings.

Dodge, DeSoto, and Chrysler use a fluid coupling between engine and the conventional transmission. Chrysler's fluid coupling combines an electric-and-vacuum-operated transmission. A fluid coupling, combined with an hydraulically operated gear transmission, is employed by Oldsmobile, Cadillac, and Pontiac. The Hudson shifts gears through an electric-vacuum system.

Buick's torque-converter is basically two shells with vanes—similar to two grapefruit halves from which the meat has been eaten. These shells are enclosed in an oil reservoir. The forward shell is rotated by the engine; the rear shell is attached to the driveshaft. As the engine-driven shell rotates, it picks up the oil and whirls it against the other shell. As speed increases, energy is transmitted to the second shell. Thus the engine-driven shell might be referred to as a pump, the driven shell as a turbine.

With the car in conventional high gear, a fluid coupling can be used to start and run the car, but starts are slow because torque is low. The coupling provides the equivalent of a fluid clutch between the engine and transmission.

In the Buick, engineers interposed between the two shells (Nos. 1 and 5 in the illustration), two more vaned wheels (Nos. 3 and 4). They are called "reaction members." They are mounted so that under certain loads they stand still and under other conditions they rotate freely. In the fixed position, they multiply the torque transmitted to the turbine.



Buick's new torque-converter.

Reaction wheels are locked and unlocked through action of oil passing through their vanes. In starting, there is rapid vortex flow of oil. This vortex flow puts high forces on the reaction member "stator" vanes and locks them in position, multiplying the torque. As load eases, flow becomes less turbulent and the reaction wheels are freed, first No. 3, then No. 4.

A secondary pump wheel, No. 2, also has been added to the Buick converter. It "free wheels" during starting, and is locked to, and rotates with, the primary pump wheel as the converter approaches a simple fluid coupling.

An hydraulically controlled planetary transmission permits driver, by using lever on the steering wheel, to set transmission at driving range; put car into emergency low, locking planetary transmission so driving torque from converter's output shaft is multiplied before it reaches the rear wheels; and shift into reverse.—Business Wk, Ja 17, 21

HOW TO DESIGN FOR SHOCK RESISTANCE

Most obvious protection of devices against damage or operation failure from shock is rubber mounting. But for severe shocks and heavy equipment, rubber compresses and acts as a solid mounting. A second type of shock-resistant design is use of inertial interlocks. This makes it possible to modify many standard control devices so that they will not be operated by severe blows. A more promising shock-proofing method is mechanical wedging or locking. This takes in a variety of possibilities, such as cam-operated switches—where shock does not turn the operating cam—or electromagnetic locks.

"Balanced" design is the best method of shock proofing. This requires that each moving part be statically balanced about the pivot point, or be interlinked with another part for reactive acceleration balance. Then a shock that tends to move part of linkage will put equal and opposite reaction on the part through members to which part is linked.—Prod Eng, Ja, 140

WATCH NUCLEAR PROGRESS

Any corporation which expects to be doing business 25 years from now must keep in touch with atomic progress. Nuclear research now underway will change the pattern of industrial operations tomorrow. Already more than 1,000 industrial possibilities of radioisotopes have been catalogued. Their principal value lies in their unique ability to show how processes take place.—Chem Eng, Ja, 256

RATE-GYRO AUTO-PILOT

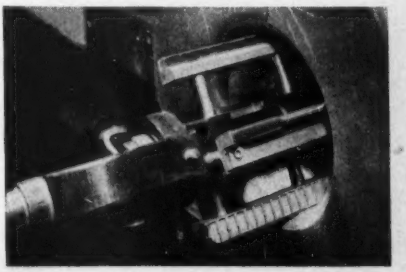
Unaffected by plane maneuvers, the new Westinghouse Electric Corp. automatic pilot employs three separate but coordinated rate gyroscopes, one for each axis of motion. Rate-gyros were selected because they are unaffected by high rates of acceleration and are responsive to changes in angular velocity. Applicable to light planes, unit employs direct means of providing bank control and reducing power requirements.—Air Trans, Ja, 50

ALIGN HONING ELIMINATES SCRAPING OF BEARINGS

New time-saving assembly technique developed at E. W. Bliss Co. is "align honing" of press bearings on the production line. This method finishes two bearings in line to extremely close limits of size, roundness, taper, and alignment, and eliminates bearing scraping, often a production bottleneck.

First step is to check rough bore with dial gage to determine how much stock is to be removed from each side. The two honing heads, separated by a spacer shaft, then are inserted into holes and rotated by a pneumatic drill through a universal joint. Operator strokes honing unit back and forth over entire bearing surface. Bulk of stock is removed with 60-grit stones, and finishing is usually with 150 grit. Finishes of 5 microinches rms. are possible. Operation requires about 1 hr.

Secret of process is design of the Sunnen honing heads used. These have two stones and two guides. Positive adjustment eliminates tendencies of hone to follow any untrue contour of hole.—Am Mach, Ja 15, 88



Close-up of one of the honing heads used in align honing.

10- AND 15-DENIER NYLON ADDS KNITTING PROBLEMS

Almost all problems of knitting fine yarns are intensified when 10- and 15-denier monofilament nylon yarns are used. Still in experimental knitting stages, some manufacturers believe sizing and twist add much to stockings, others believe knitting should be done directly from the pirn. It is certain, however, that slower speeds will be necessitated. On a 51-gage machine, knitting should be slowed from 70 to 67 courses per min.

Yarn must not be touched on the pirn. If touched, yarn will stick. When knitting directly from the pirn, press-offs must be avoided. A small-polished wire ring in the end of the bobbin will make the yarn balloon around end of bobbin and prevent snagging or chafing.—Textile World, Ja, 123

CONTROLS PLASTER CRACKS

Studies conducted by the Bureau of Reclamation indicate that cracking of portland-cement plaster can be controlled by leaving a joint between ceiling and wall slabs and around fixtures. This permits slabs to move freely during drying. Bond between ceiling plaster and wall can be prevented by a coat of paint, hot paraffin, or a strip of tape. Joints can be concealed by moldings, ornamental beads or plastic fillings.

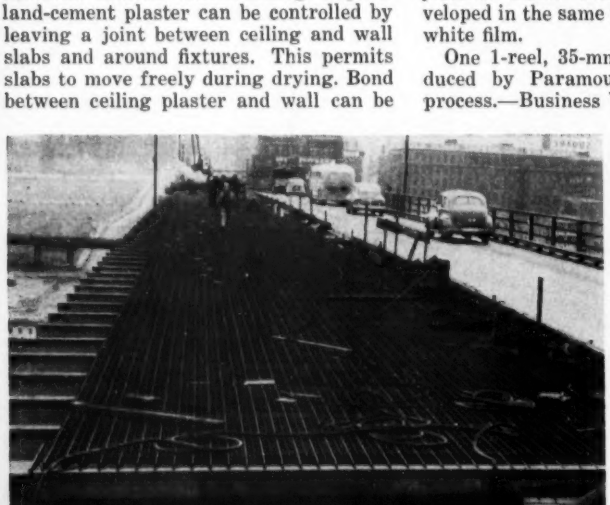
If drying conditions are controlled plaster can be placed at 24 hr. intervals no coating being needed during damp curing until plaster is hard enough to take water without damage. Total plastering time can be cut from 10-20 days to 3-6 by this method.—Eng News-Rec Ja 8, 85

NEW COLOR-FILM PROCESS

Full-color movie film can be printed on a single layer of black-and-white film from a conventional color-separation negative with Polaroid Corp.'s new process. Many of the steps necessary in standard printing methods are eliminated.

All film materials, chemicals, and processing agents used are standard and can be applied with standard movie-film processing equipment. Product can be projected by all conventional movie projectors. Sound track is exposed and developed in the same manner as black-and-white film.

One 1-reel, 35-mm. film has been produced by Paramount Pictures Studios process.—Business Wk, D 27, 43



WELDED HIGHWAY DECK—Replacing the copper highway deck of an old-3-span Mississippi River highway and railroad bridge, welded steel floor system incorporating wide-flange floor beams and stringers on existing columns were used to support a steel grating deck filled with lightweight concrete. About 1,250,000 lb. dead load was eliminated on the 1,524-ft. long structure. This type of construction saved an estimated $30,000. — Eng News Rec, Ja 8, 88

ECONOMICAL CAR—Giving 45-50 miles per gal. of gasoline, this 2-cyl. Towne Shopper, manufactured by International Motor Car Co., has engine in rear, the front section being used for storage. All aluminum except for axles, bumpers, bearings, springs, and steering column, the car will sell for $595, fob. San Diego, Calif. —Business Wk, Ja 3, 25

CAUSE OF BONE DARKENING IN FROZEN CHICKENS

Darkening of the bone and adjacent flesh occurs in frozen chickens when they are young and bones are not calcified. It is caused by bloody marrow, leaking through the bone during freezing, thawing, and cooking, but does not affect aroma, flavor, or texture of chickens. It is worse in the knee joint and occurs slightly in the back and first joint of wing. Blanching cut-up chicken before freezing prevents bone darkening, but adversely affects flavor. Storing at 10°F. or higher accentuates discoloration, while storage at −15°F. or lower prevents it almost entirely.—Food Ind, Ja, 116

HIGH-TEMPERATURE GREASES

Successful operation for hundreds of hours at temperatures from 300 to nearly 400°F. is claimed for silicone grease. This grease has a low evaporation loss and little change of consistency between low and high temperatures. Wearing ability is the principal limitation of silicone grease.

In addition to silicone grease, there are at least two types of grease containing synthetic oil which are promising at high temperatures. Lithium is finding considerable favor as the soap element in grease.

Eventually, greases will be developed which will satisfy all high-temperature demands for machines and devices.—Prod Eng, Ja, 93

FAST EARTH MOVING

To move 50,000 cu. yd. of dirt daily, for 25¢ per yd., at new Baltimore Friendship Airport, three types of equipment are used by C. J. Langenfelder & Son. Wagons loaded by shovel or elevating loader handle the long hauls, often 1 mile. High-speed earthmovers operate up to 2,500 ft. Tractor-scraper combinations haul on shorter runs of 1,000 ft. or less. Output of the respective types of equipment is about 25, 45, and 30%.

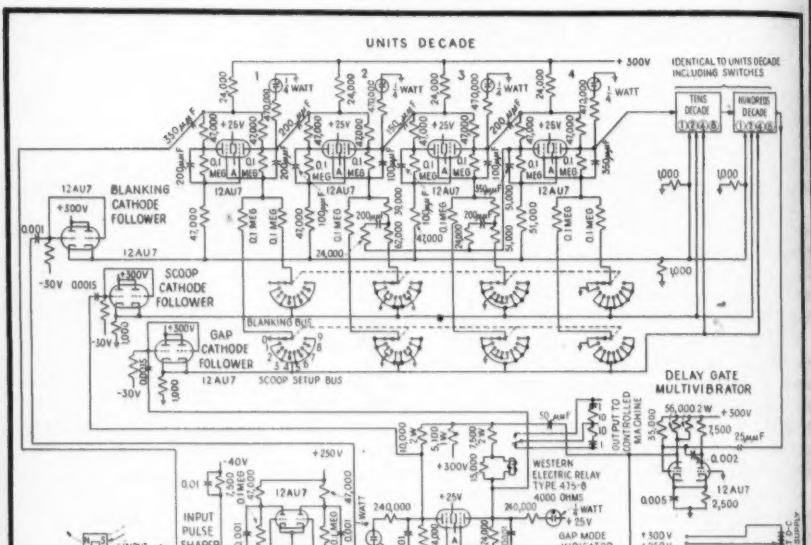
The long-haul fleet consists of eleven 13-yd. bottom dumps served by a pair of 2-yd. shovels. On the intermediate hauls are 16 scrapers of 12- to 14-yd. capacity, coupled to 2-wheel tractors. Eleven crawler tractors pulling 12-yd. scrapers make up the short-haul fleet. The equipment operates 20-hr. daily.—Cons Meth, Ja, 102

TWO COMPANIES BEGIN SYNTHETIC FUEL PLANTS

Two companies—Standard Oil & Gas Co. and Carthage Hydrocol, Inc.—will build synthetic fuel plants to convert natural gas into gasoline, oil, and chemical by-products. Plants will be in operation in 1950 and 1949, respectively.

Carthage's plant—to cost $19,000,000—will consume 50,000,000 cu. ft. of oxygen and 90,000,000 cu. ft. of natural gas for the production of 7,000 bbl. of oil products and 150,000 lb. of chemicals daily. About 53,000,000 cu. ft. of oxygen and 100,000,000 cu. ft. of natural gas will produce 7-8,000 bbl. of oil products and 100,000,000 lb. of chemical products at Standard's $55–$80,000,000 plant.

Both companies believe the synthetic fuel can be made competitive with natural products costing 10.5–11.5¢ per gal. for 73–75 octane gasoline.—Business Wk, Ja 24, 21



ELECTRONIC PROCESS CONTROLLER—Designed to control a two-stage zipper making process by counting rapidly repeated operations in each stage, an electronic counter developed by Conmar Products Corp. has numerous other process-control and computer applications. Predetermined counting is accomplished by initially setting up a scale-of-N counter at some indicated count C less than N. The circuit then will count N—C input pulses before delivering its first output pulse. This presetting permits control, rather than merely pulse register. The output also may be used to trigger circuits which set up the counter at some new count C^1 instead of allowing it to revert to zero. The elements include a scale-of-N counter, an electronic switch to determine the succession of starting counts C, C^1,—C^N, and means for injecting setup pulses. Above is a complete schematic diagram of dual predetermined counter.—Electronics, F, 88

New Turbojet Engine Designed

New unit stresses fuel economy, reliability, and ease of maintenance and manufacture; is assembled from five major components

Fuel economy, reliability, and ease of maintenance and manufacture are promised by a new turbojet engine designed by John Hawkins and Associates. The new engine cycle employs a compression ratio of approximately 6:1 with a peak combustion temperature of about 1300°F. Peak turbine inlet temperature is held at 1250°F. at sea level.

Unit is assembled from five major components: entrance diffuser and accessory section, compressor, burner, turbine, and exhaust nozzle. Circumferential joints are provided for each unit to simplify handling.

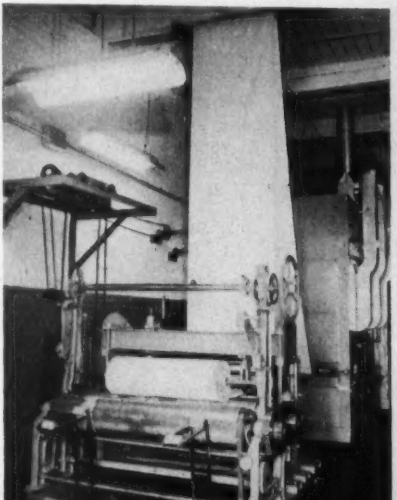
Except for bearings and gears, high-alloy, heat-corrosion-resisting steel is used. No castings are employed. The 1,200-lb. engine is mounted on two trunnion pairs 80 in. apart. It is 144 in. long overall, has a 40-in. diameter.

Diffuser and Accessories—Nose fairing of compressor hub comprises engine accessories section. Power accessories are power driven at 7,500 rpm. from front end of the compressor shaft and are supported from the compressor front bearing housing-support structure.

Compressor—A conventional 8-stage, axial-flow unit, mean angle at design radius of both rotor and stator blades is 45 deg. Blades are forged and have rectangular base plates curved to form portions of air-passage walls.

Burner Section—Air leaving compressor is led through an annular duct to turbine. Here, air flow is reversed by passing around a 180-deg. bend and into a second duct, the outer wall of the second duct being the inner wall of the first. Fuel-injection nozzles are located immediately down stream of the bend. Approximately halfway back from the turbine to compressor, airflow is reversed into a third duct located inside the second one and leading to turbine entrance, the third duct having a number of radial fins acting as a flame grid.

This type of construction minimizes danger of burnout through two walls and two moving streams of air; heat leaving combustion chamber is returned to washing area. Since it is possible to have the air mass move in a downward direction, it is important in a reversible flow system because flow path could reduce losses.—Aviation Wk, D 22, 22



MAKES BONDED-WEB CLOTH—Cotton or rayon fiber is converted into a bonded-web cloth in 90 sec. by this machine designed at Avondale Mills. Synthetic resins bond fibers into sheets either with or without color. Uncolored cloth can be piece dyed or printed. Machine is 100 ft. long, produces 37-in. wide cloth.—Textile World, Ja, 121

CONTINUOUS BEAMS SIMPLIFY BUILDING DESIGN

A 4-story, reinforced-concrete, rigid-frame, 50 x 140-ft. store, sandwiched in between two existing buildings, used floorbeams continuous over two supports and having cantilever ends to permit columns to be 10 ft. inside property lines. The construction greatly simplified the problem of footings. The two rows of concrete columns are spaced 32 ft. apart longitudinally. Footings rest on sandy clay and are designed for a unit soil pressure of 5,000 psf.

Floors, 4-in. thick, are supported on 16 x 20-in. reinforced-concrete beams 9 to 11 ft. apart. Floorbeams are carried on 24 x 32-in. continuous girders and cantilever beyond the girders.

To simplify framework, dimensions of columns above the first floor and of the portions of the ribs, beams, and girders below top slab are duplicated. First-floor columns are 34 in. square, but others are of 24-in. dia., the concrete varying from 3,000 psi. at top to 5,000 psi. at bottom.—Eng News-Rec, D 25, 65

EFFICIENT TRACK PULLER

To pull 23.8 miles of open Tee rail from ties, Memphis Street Railway Co. designed and built its own machine, called the "Lizzard." Rail was drawn through a steel structure and over a 6-in. dia. roller. Prior to pulling, rails were nicked into 21-ft. sections. A 50-ton electric locomotive pulled the "Lizzard." As nick in rail passed over the roller, rail broke, falling free of the unit.

About 2,300 tons of 70-, 75-, and 80-lb. rail were pulled in 32 hr., averaging about 74 tons per hr.—Bus Trans, Ja, 62

BUILD-IT-YOURSELF PLANE

Dart Aircraft Corp. will produce personal planes in kit form for assembly by owner. Kits, made and packaged at the factory, contain 22 items, including prefabricated sections and parts, nails, fittings, and glue. Kits carry detailed instructions, describing assembly in logical sequence. Necessary tools for assembly are those found in any well-equipped workshop.

Prefabricated parts are numbered and/or marked at proper points to facilitate joints and subassemblies. For power, engines ranging from 90 to 145 hp. can be used.—Aviation Wk, Ja 5, 21

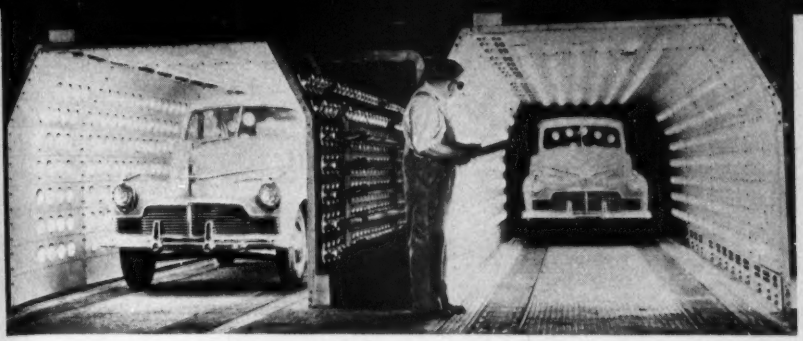
RADIO CLOCKS AIR SPEED

Precise measurement of aircraft speed for test purposes is possible with a new method developed by the Army Air Forces. It involves an all-altitude speed course defined by two parallel radio beams a fixed distance apart. The test plane flies at the desired altitude and on a heading perpendicular to the two beams. True ground speed is obtained by measuring the elapsed time required for an airplane to fly this known distance. Airborne radio equipment sends signal to ground receiver and electronic chronograph at instant of passage through each beam.

The two ground radio transmitters are similar to instrument landing system (ILS) beam transmitters. Desired frequency is obtained by inserting an appropriate crystal unit and returning the transmitter circuits.—Electronics, F, 72

MORE METHANOL COMING

Methanol has long been one of the synthetic organic chemicals in short supply, and the demand for it has been growing rapidly. In 1948, two of the five present U. S. producers will greatly increase their facilities, and three new producers will enter the field to increase capacity 40%. Production this year will be about 110 million gal., and is expected to create a close balance between supply and demand. Next year, capacity will be about 138 million gal., with further expansion to 150 million gal.—Chem Eng, Ja, 110



Automobiles pass through 32-ft. infrared tunnels for touch-up drying of prime coat on bodies in about 3 min. Eight hundred 250-watt reflector lamps are used.

INFRARED IN INDUSTRY

—Report to Management—

THERE has been widespread and ever-increasing interest in infrared radiation for an almost endless number and variety of heat applications since the war's end. The convenience, speed, and economy of this very practical source of easily directed and controlled heat make it a "tool" with which industry can speed many processes and solve many problems.

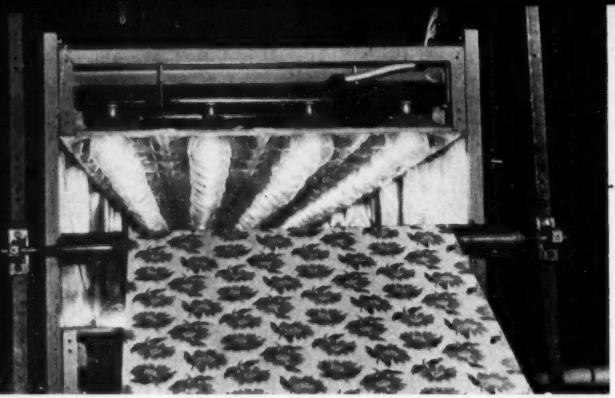
Speed is the most important of the advantages of radiant heat for industrial purposes. This is particularly true of the curing or drying of synthetic surface finishes. Infrared heat, like light, is projected at a speed of 186,000 miles per sec. without being absorbed or obstructed by the atmosphere through which it passes. When adjusted for an operation, an infrared oven seldom requires subsequent adjustment. This minimizes need for experienced or skilled labor. Simplicity of this equipment also permits quick installation to meet unexpected requirements of increased production which otherwise might be impeded by lack of proper heating or baking facilities.

Many industries are turning to infrared lamps as a convenient solution to a wide range of heating and drying applications. While the most spectacular results have been in the quick-drying of finishes, the lamps have proved of great value in the textile, ceramic, paper, metalworking, foundry, and plastics industries. Speed is the great advantage of radiant heat. Flexibility and simplicity are other merits.

Any desired degree of flexibility of control can be achieved by proper wiring or construction of a radiant heat installation. Where material of varying widths passes under a bank of lamps, rows of lamps may be turned off or on. When materials of varying thickness, moisture content, or color are to be dried or heated, the heat output can be varied by changing the voltage applied to the lamps, by turning on or off lamps in rows perpendicular to direction of travel of the material, or by changing the speed of the material through the oven.

To accommodate varying conditions, such as size and shape of product, radiant-heat equipment may be designed to permit changes in contour of the lamp bank. This is the most economical use of the oven.

Immediate change



To supplement steam in drying dye-printed pattern cloth, two banks of infrared lamps (one above, one below) are used. Production was increased from 75 to 110 yd. per min. on some patterns. Number of 500-watt lamps is 144, with gold-plated reflectors.

in temperature or energy requirements are possible with radiant heat, avoiding production delays. With steam cans or convection ovens, there is always a lag in change, because of the latent heat.

Also unlike convection or conduction heaters, radiant heaters require no warmup period, and therefore cause no morning or after-lunch production hold-up. Likewise, there is no cooling time lag when radiant heaters are turned off. So the labor and power savings during starting and stopping periods alone may be sufficient to justify the choice of radiant heat.

Uniformity of results is essential in many of today's heating operations. This usually can be assured only by application of heat at a uniform rate. When once adjusted, radiant heat applies energy at a constant rate, little or no control or attention being necessary.

In regard to cleanliness and working conditions in the factory, radiant heating installations offer advantages. They do not heat the surrounding air as much as conventional steam-heated rolls or cans, nor do they increase humidity or cause messy floors through leaky valves and connections.

Cost of radiant-heat equipment for a given purpose usually is appreciably less than that of corresponding convection or conduction equipment. This is due to its outright simplicity, lower installation expense, and elimination of expensive insulated ovens. In some cases, too, it is necessary to provide and operate boilers for the sole purpose of supplying steam for a heating process. Where it is possible to eliminate such equipment by using radiant heat, the savings may be of considerable magnitude even though the cost of electric power may be higher than that of steam. As a specific example of initial cost, an infrared woolen cloth carbonizer may be cited. This oven uses 175 reflector-type 250-watt lamps in parallel banks 12 in. apart to carbonize the cloth, following conventional drying, at a rate of 25 yd. per min. The installation cost approximately $1,000, only one-tenth to one-sixth as much as a conventional carbonizer.

Maintenance of radiant-heat equipment is simple, consisting principally of infrequent replacement of broken or burned-out lamps and occasional cleaning of lamps and reflectors. Repairs can be made almost immediately because there is little or no latent heat in the equipment.

Because a greater amount of energy per unit area is applied with radiant heat, the installation usually occupies less space than conventional heating and drying equipment. And being relatively light in weight, infrared lamps and their auxiliary equipment may be suspended from, and mounted near to, the ceiling to save floor space. The ability to concentrate energy in small areas makes

radiant heat particularly useful as a supplementary source of heat where increased production is desired but where available space is insufficient or other conditions prevent enlarging the existing equipment. In some applications, infrared units are mounted within the confines of existing equipment.

Where danger of fire or explosion exists with the usual type of enclosed convection oven when volatiles are driven off, the hazard can be minimized by using unenclosed infrared equipment. In these ovens, natural convection currents usually are sufficient to keep the concentration of volatiles below the danger point.

Improvement in quality of finished product often has been reported when infrared replaced other heating methods. Inspection in process is easy, since infrared ovens generally are not totally enclosed. Infrared heaters may reduce the spoilage of material resulting from unexpected production-line stoppages due to breakdown, because the heat can be cut off almost instantly by interlocking controls.

Portability is yet another advantage of infrared equipment. Being relatively light in weight, the smaller installations can be so constructed that they may be moved from one location to another as plant operations dictate. Small portable units also are useful in applying heat to heavy equipment, as in drying water-soaked motors, without moving the equipment.

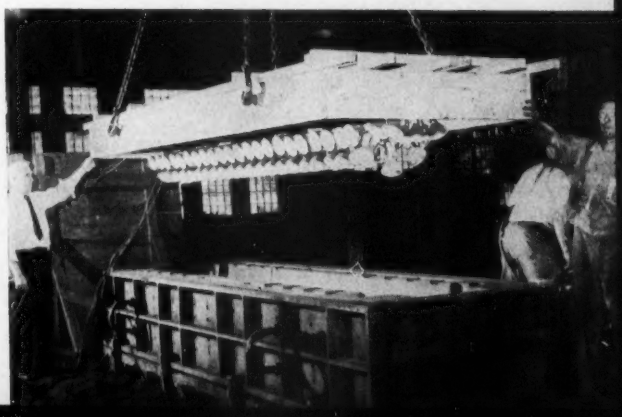
Uniform application of heat in a vertical oven is possible with radiant heat, since air is not a medium of heat transmission and rising convection currents are not a great factor.

Used for Many Purposes

Drying Finishes—Although radiant heat has found use in numerous industrial heating and drying applications outside the surface-finish field, the latter offers by far the greatest possibilities. It now is generally recognized that any finish that can be baked at all can be baked with infrared radiation. It formerly was thought that some special catalytic effect might account for remarkable speed of the process. However, the reduction in time depends largely upon more rapid heating of the work and an increase in temperature of the work.

Although baking japans can be baked with drying lamps, the time required (½ hr. at 450°F., for example), makes the method impractical.

Oil paints cannot be baked. Drying of lacquers is accelerated by heat, but the temperature is limited to 150°F. Synthetic lacquers normally are air-drying



Mold drying infrared unit being lowered over a mold for a 1400-lb. casting. Mold is dried in 3 hr., at half cost of torch drying, by 150 reflector-type 250-watt lamps.

materials. Oleoresinous enamels can be baked in 10–15 min. at 350°F. with the lamps. Synthetic enamels can be baked with lamps, provided too short schedules are not required and the shorter oil materials are used. The process is more satisfactory, however, for synthetics modified by heat-hardening resins, such as urea formaldehyde.

Infrared heat will dry finishes on wood, but temperature should not exceed 150°F. and should be attained slowly—in 2½–3 min.

Textile Processes—Following the drying of paints and other surface finishes on automobiles, aircraft, appliances, and other products, the textile industry is perhaps next in offering opportunities for use of infrared drying. Already it is widely employed to speed existing equipment.

Drying Ceramics—Radiant heat lends itself readily to many of the problems of the porcelain or ceramics industry. Insulators now are dried more rapidly by lamps than by hot-air blowers. Portable banks of lamps speed the drying of freshly molded porcelain bathtubs prior to glazing. This avoids moving the tubs while wet and reduces spoilage due to distortion. Floor-space requirements are cut in half, also.

Pottery Making—Pottery manufacturing methods have been revolutionized by infrared drying of china flatware. In a typical installation, drying time has been reduced from 90–150 min. to 12–15 min., and the number of molds for a given item from 150–200 doz. to 25–30 doz. Pieces with embedded foreign particles crack in an infrared dryer, reducing the number of defective pieces from the bisque fire. Infrared is replacing air in drying lacquer finishes on pottery, with great reduction in handling, breakage, and floor space. Possibilities are almost unlimited for use of infrared in this field.

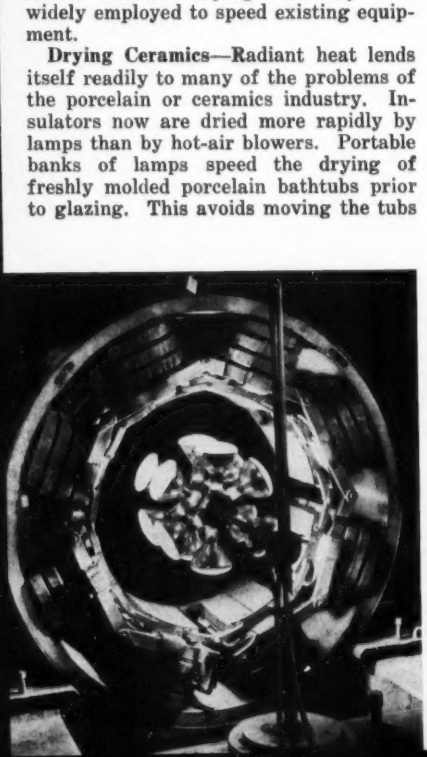
Paper—In the paper industry, infrared has been used principally as a supplementary means of water evaporation and for drying coatings, glue, etc.

Metals—Following degreasing and plating operations, metal forms, parts, and sheets are being dried faster and cheaper with infrared-lamps. Radiant heat also is economical in preheating metals prior to welding and for expanding shrink-fit parts. It offers possibilities in the rapid heating of sheet metal prior to punch-press operations to reduce wear on dies and tools.

Molds—Foundry practice has been modernized by the use of portable radiant-heat equipment for skin drying sand molds. Cleaner, higher-quality molds are produced, and damage to greenmolds is practically eliminated. Infrared cures the binders in cores.

Plastics—Powders are being dried with infrared heat, and molding preforms are baked. Plastic sheets are softened to facilitate cutting, stamping, or forming. Colored surface finishes are dried also.

Other Industries—The foregoing applications cover only a few of the more important fields where radiant heating is



Motor stator refinishing is facilitated greatly by a simple arrangement of 12 reflector-type 250-watt lamps.

inding use. To them might be added almost any industry or manufacturing process where heat is required.

Infrared Equipment

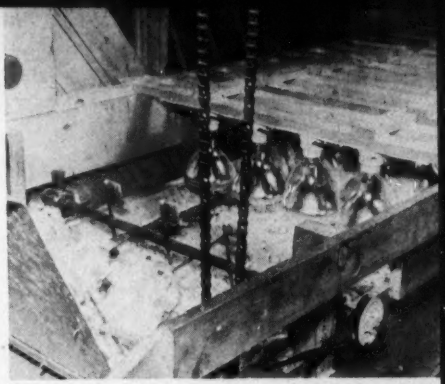
The modern infrared lamp is a modification of the general-lighting-service incandescent lamp. It operates at 4000°F. filament temperature, compared to 4800° F. for a general-purpose lamp, since the amount of light produced is not important. Its life is thereby increased to 5,000 hr. or more for a tungsten filament. There are two general classes of lamps for industrial heating and drying purposes, one using a carbon filament, the other tungsten. The lamps are regularly available in the 110–125-volt range only.

In general, the advantages of carbon-filament lamps are: (1) Lower operating brilliancy, reducing annoying glare when lamps are in the line of vision. (2) Greater uniformity of beam pattern, the shorter filament wire making concentration more feasible and less costly. This may be important when the irradiated surface is stationary with respect to the lamps.

Principal advantages of the tungsten-filament lamp are: (1) Longer and more uniform life, because of slower filament deterioration. (2) Higher radiant-energy output per watt throughout life, since the bulb does not blacken as rapidly as with a carbon filament.

Carbon-filament lamps are available in a variety of wattages, while the tungsten-filament types so far have been confined largely to the 100-, 250-, 375 , 500-, and 1,000-watt sizes. There are two general types of lamp, one requiring a separate reflector and the other having a self-contained reflector consisting of a deposit of vaporized aluminum or silver on the inner surface of the bulb. At present, the latter is available only in 250- or 375-watt ratings.

In mounting infrared lamps, care should be taken to avoid vibration from

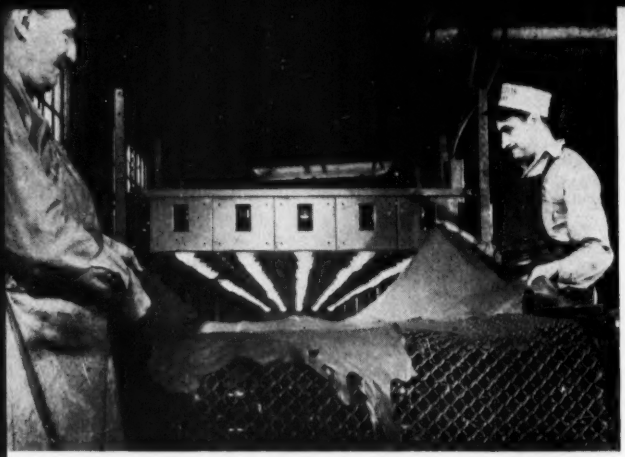


Shredded fish is dried rapidly, without "cooking," by two banks of 110 reflector-type 250-watt infrared lamps above conveyor. The product is fed onto a steel-mesh belt, spread to ½-in. depth, and cascaded from one conveyor to another. Air is forced gently up through belts. Capacity exceeds 500 lb. per hr.

machinery to minimize damage to the filaments. It may be desirable to mount lamp banks on the floor or suspend them from the ceiling. When movable drying lamp stands are used, rubber-wheel casters should be provided.

A radiant-heat reflector may be the counterpart of a light reflector in contour and general design, but there is a most important difference as to type of reflecting surface. Gold, in the form of a thin electrolytic plating, is used almost exclusively for the reflecting surface of open-type infrared reflectors. Open reflectors of Alzak aluminum are used occasionally, but are not as efficient as gold-plated reflectors. Aluminum and silver are the commonly used metals for coating the inner surfaces of infrared reflector-type lamp bulbs. It has not been found feasible to use gold or copper for this purpose. Since the bulb is filled with inert gas and hermatically sealed, the metallic surface, which has a high initial reflection factor, suffers no depreciation because of oxidation or collection of dirt or dust from the air.

Because of the high-temperature service, the best grade of porcelain shell



In spray-coating animal hides at rate of 27 per min., each automatic spraying station is followed by a bank of infrared lamps which dry the coat without crusting or shrinking of skins. No reprocessing is required.

sockets should be used in infrared ovens where screw-base lamps are involved. The commonly used higher wattage infrared lamps, such as 500- and 1,000-watt types, have medium bipost bases. No entirely satisfactory sockets are available for these, so braided wires are welded to the base posts and connected to the power wiring. The socket serves as a lamp holder only, and carries no current.

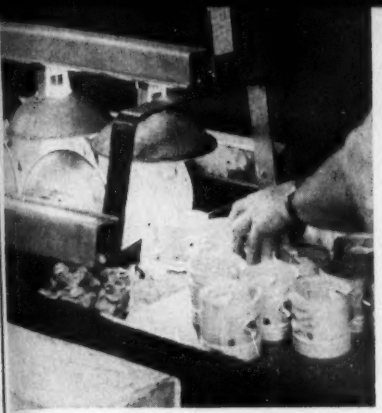
For most efficient operation, conveyors are used to carry products through the infrared oven on the production line. In many cases the object should be rotated slowly as it passes through the heat zone so that all surfaces are exposed to the direct infrared rays. Rotation can be accomplished by a continuous series of revolving platforms or spindles supporting the objects, or by revolving hooks from which the objects are suspended.

Most radiant-heat installations are of the open type, using no forced-ventilation equipment. But if the oven is in a confined space and fumes from processing are toxic or inflammable, ventilation equipment discharging to outside air may be necessary. Usually a hood over the oven, connected to a stack, will suffice. Where water is evaporated rapidly in a drying operation, forced draft to remove the vapor rapidly greatly expedites drying and reduces the cost of the operation.

When material, such as cloth, is being dried in a continuous piece, air movement should be parallel to the plane of the material and perpendicular to direction of movement of the material. Materials of relatively small particle size, such as shredded codfish and broken tobacco stems, sometimes are dried by infrared heat applied from above, assisted by air blown from below through perforations in the conveyor belt.

Available infrared equipment ranges from wired channels with various socket spacings to finished ovens complete with conveyors, drive equipment, and accessories.

The temperature produced by an infrared unit depends upon various factors, such as distance, color, and smoothness of the surface, and nature and thickness of material. A mercury thermometer in the infrared beam would give no indication of temperature of object heated, since the infrared reflection and absorption characteristics of mercury likely will differ widely from those of the object heated. For determining intensity of radiant energy delivered by an infrared generator to any point in the beam, a portable direct-reading radiation meter is available. Actual temperatures attained by a



Automotive pistons are expanded by heat in a small tunnel of 250-watt infrared lamps to allow insertion of pins.

material being heated are most readily determined by a thermocouple attached to material. Lacquer, crayons, and pellets are available which change their appearance at a certain temperature.

Infrared oven should be designed so that drops of liquid do not fall on lamps. When objects of diversified shapes and dimensions are handled, damage to lamps may be averted by a mechanical guard at entrance which shuts off conveyor power if struck by an object of excessive size. Interlocking of conveyor and lamp power circuits so that lamps are turned off when conveyor stops is important.

Infrared radiation usually is most effective when there is a 90-deg. angle of incidence of the heat rays with the surface heated. Therefore the oven contour should be like that of the object heated. Drying a globular-shaped object requires an oven of circular cross section and also revolving the object on its vertical axis. A cubical object might be suspended from one corner and rotated in an oven of circular cross section.

Generally, infrared cannot be used economically to heat materials such as gold, silver, copper, chromium, and aluminum, which reflect a relatively high percentage of radiant energy. However, infrared can be used to dry various types of finish on the surface of such materials. Neither is infrared suited to heating materials with high infrared-transmission factor, such as most kinds of glass.

Materials of granular nature, or small particle size, should be passed through the heat zone on an inclined vibrating surface for proper particle exposure. A series of plows or rakes can be used to turn the material on a conventional conveyor belt, or a series of belts in cascade arrangement may be employed.

Gas-Fired Infrared Generators

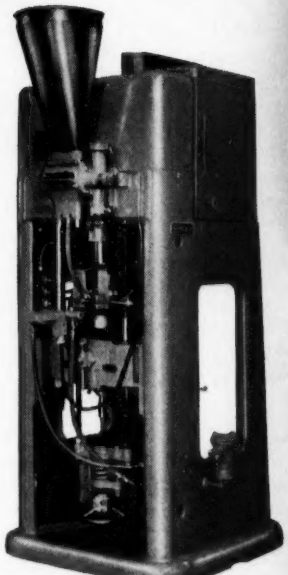
Outstanding advantage of gas as compared with the electric infrared generator lies in the former's ability to produce a higher concentration of heat than is feasible with electric equipment now available. For example, a burner of 2⅜-in. dia. discharges heat at 32,000 Btu. per hr. with gas pressure of 1 psi; a 6⅜-in. dia. burner is rated at 103,000 Btu. per hr. A 375-watt R-40 bulb infrared lamp of 5-in. dia. generates 1,200 Btu. per hr.

Gas-fired infrared units are most useful in annealing, forging, and brazing of metals, the firing of ceramics, and application to high-speed printing presses. In the metal heat-treating field, solid 3-in. round billets are reported to have been brought to a uniform 2100°F. temperature in 8 min. in a gas infrared apparatus no larger than a wastepaper basket. Infrared gas burners are said to have made it possible to increase printing-press speeds from 350 to over 1,000 fpm.—*From "Industrial Applications of Infrared," published by McGraw-Hill Book Co.*

All Rights Reserved

Items appearing in the McGraw-Hill Digest may not be reproduced, in full or in part, without written permission of the publishers. Contents copyrighted, 1948, by the McGraw-Hill International Corp.

Completely Automatic Molding



15-ton Completely Automatic Molding Machine Patented in U. S. and abroad.

FOR HIGH SPEED, MOST ECONOMICAL PRODUCTION OF PLASTIC PARTS

Stokes Completely Automatic Molding Machines all over the world are making thousands of different plastics parts . . . with economies that no user of plastics parts can afford to overlook.

Molding time is cut . . . molding material is saved . . . mold cost is lowered . . . output per cavity is high.

You can mold highest quality parts right in your own plant as you need them—maintaining a minimum inventory.

These simple, rugged, fool-proof machines require little attention. They are thoroughly safeguarded for continuous automatic operation 24 hours a day.

Use our consulting service. Investigate Completely Automatic Molding now.

F. J. STOKES MACHINE CO.
Export Division, 767 Drexel Bldg.
Phila. 6, Pa., U. S. A.

F.J.Stokes MOLDING EQUIPMENT FJS Est. 1895

By this simple, dependable

CLARK METHOD Industry Is Handling Materials *FASTER*

*W*herever products are manufactured, stored, loaded and unloaded, Clark fork trucks are serving industry by handling materials more safely and more efficiently than by manual methods, and much more economically.

FASTER–the Clark fork truck picks up and carries materials weighing up to 7,000 lbs. These loads may consist of cartons, bags, barrels, crates or a miscellaneous combination; or may be bulk loads of castings, brick, lumber or other material.

SAVES STORAGE SPACE–making use of existing "air-rights" of present storage space by tiering. Clark fork trucks add much valuable storage space with no increase of floor area.

SPEEDS LOADING – Loading and unloading of freight cars and motor trucks is greatly simplified and accidents are reduced.

CUTS COSTS – the cost of handling materials is an inescapable loss to Industry, but the Clark Method *reduces that loss to a minimum;* it effects big savings and thereby increases profit.

There is a CLARK Machine to satisfy every handling need.

CLARK GAS AND ELECTRIC POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

CLARK EQUIPMENT COMPANY • EXPORT DIVISION
258 CHAMPION ST., BATTLE CREEK 73, MICH., U.S.A.
OTHER PLANTS — BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN
DISTRIBUTORS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

Timely — McGRAW-HILL BOOKS

INSTRUMENT and CONTROL MANUAL FOR OPERATING ENGINEERS

By EUGENE W. F. FELLER, Operating Engineer; Formerly Assistant Chief Operator, Safe Harbor Water Power Corp.; Associate Editor, Power. 426 pages, $6.00

A practical manual of finger-tip information for quick solution of specific metering and control problems. Explains basic principles of control and describes construction and operation of liquid-level, pressure, temperature, speed, and humidity indicators and controllers. Explains how units of a control system are connected to show how one unit affects another. The operating fundamentals of primary elements of control mechanism are described, the reader is acquainted with all available types of instruments and controllers, told how to operate them and is advised what points to consider in selecting new equipment.

CONSTRUCTION ESTIMATES AND COSTS. Revised Second Edition

By H. E. PULVER, Professor of Civil and Structural Engineering, University of Wisconsin. 653 pages, $6.00

A complete manual for contractors and engineers providing step-by-step instructions for quick, easy methods of securing accurate construction cost estimates. The revised edition takes up various elements of construction work separately, includes useful diagrams and tables as well as illustrative estimates, and covers every step of estimating from preliminary investigation, through approximate estimates and complete detailed estimates that include overhead, cost of plant, profit, etc. Tables and diagrams show variations in quantities as well as in prices of materials and labor.

THEORY OF SERVOMECHANISMS

Edited by HUBERT M. JAMES, Professor of Physics, Purdue University; NATHANIEL B. NICHOLS, Director of Research, Tayor Instrument Companies; RALPH S. PHILLIPS, Associate Professor of Mathematics, University of Southern California. #25 of the M.I.T. Radiation Laboratory Series. 375 pages, $5.00

This book, in two parts, deals first with frequency response techniques of servomechanism design. The required mathematical background is summarized and applications described. The second section presents a new design technique which depends upon minimization of the rms error with which the mechanism produces a desired result in the presence of electrical noise and other disturbances. The relationship of both sections is explored, the discussion is illustrated with many examples and the book closes with an account of the applications of these techniques to servomechanisms operating with pulsed data.

THE COLOR OF LIFE

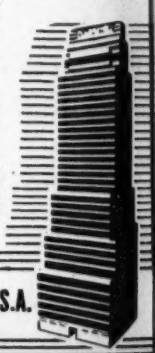
By ARTHUR G. ABBOTT. 294 pages, $5.00

An interesting, useful reference book presenting facts and theories about color for laymen and those concerned with color problems in art, designing, interior decorating, fashions, advertising, drama, etc. Explains color terms, names, how to tell harmonies from discords and tells how to use color effectively. Eight color plates are included.

RETAIL CREDIT FUNDAMENTALS Revised Edition

By CLYDE W. PHELPS, University of Southern California. 318 pages, $5.00

This official textbook of the National Credit Association is a practical treatise designed to meet the basic needs of Association members, thoroughly covering those basic functions which employees in credit departments should know. The author provides a practical rather than academic presentation of the cycle of credit work to present an elementary text intended to prepare the credit man for further retail credit study.



McGRAW-HILL BOOK COMPANY, 330 West 42nd Street, New York 18, N. Y. U.S.A.

DoALL Contour Sawing

Reg. U.S. Pat. Off.

INDUSTRY'S MULTI-PURPOSE PROCESS FOR FASTER LOW-COST PRODUCTION . . . . FOR CUTTING ALL MATERIALS

19 Models

Contour Sawing saves industry thousands of man-hours every day. It slices off unneeded parts instead of "whittling" stock to shape like other machine tool processes. With many special blades and infinitely variable speeds, Contour Sawing cuts anything and makes amazing production economies in all industries. Internal or external, curved or straight cuts can be made at any angle. Operators can be trained in a few days—do not need years of machinists' experience. Write for free literature.

Blades for Every Purpose

Iron . . Steel . . Copper . . Brass . . Aluminum . . Forgings . . Dies . . Tools . . Machine Parts . . Castings . . Stainless Steel . . Tungsten Carbide . . Heat-Treated Steel . . Alloys . . Wood . . Plastics . . Laminates . . Hard-Pressed Boards . . Cloth . . Ceramics . . Glass.

The DoALL Company

Reg. U. S. Pat. Off.

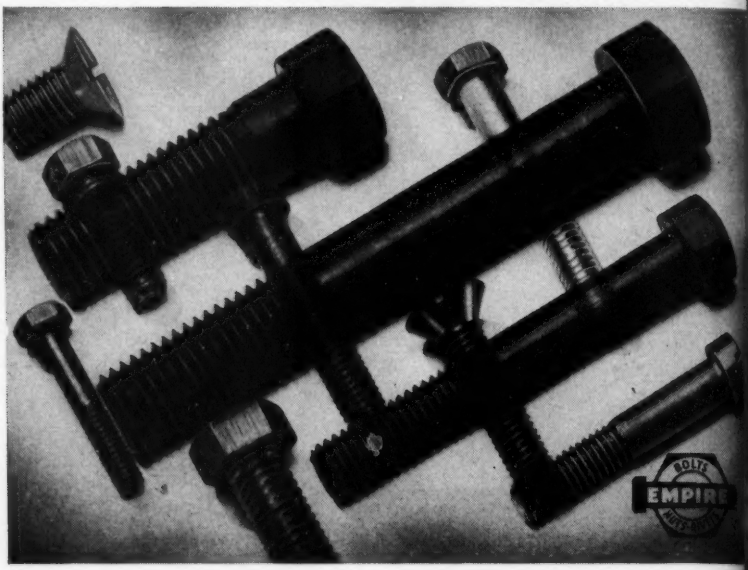
REPRESENTATIVES IN 56 COUNTRIES

DoALL STORES IN KEY CITIES

Des Plaines, Illinois

Cable Address: DoALL, Des Plaines

X748-E



RB&W Empire Cap Screws for the Product of Quality

For the utmost strength, close tolerance dimensions, and a finish that enhances the appearance of the final product . . . many of the world's most famous manufacturers specify cap screws by RB&W EMPIRE.

You will see them on products of General Electric, General Motors, Deere and Company and Bendix Corporation — representing the world's highest standards of quality manufacture.

And, for any assembly to be fastened with bolts, nuts, screws, rivets or allied fasteners — RB&W's complete line offers the maximum in dependability. Order through representatives listed below.

GET IN TOUCH WITH THESE REPRESENTATIVES

EGYPT — Shalon Brothers & Co., P. O. Box 716, Cairo

FAR EAST — Muller & Phipps, 1 Park Ave., New York, New York

GREECE — Nicholas John Coroneos, Stoa Rizari, Piraeus

IRELAND — American Exports Co., 30 South King St., Dublin

NEWFOUNDLAND — James G. Crawford, St. Johns

PALESTINE — Efco Agency, P. O. Box 1181, Tel-Aviv

SOUTH AFRICA — Arthur E. Harris, P. O. Box 1199, Johannesburg

TURKEY — Leon Bernardin Marco, Posta Kutusu 85, Istanbul

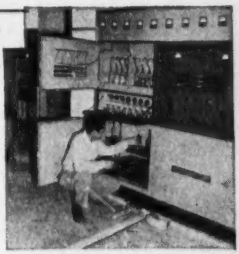
RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

EXPORT DEPARTMENT, PORT CHESTER, N. Y. • (PLANTS AND OFFICES IN MAJOR INDUSTRIAL CITIES

WESTINGHOUSE NEWS

RADIO IN PUERTO RICO

WIBS (The Voice of the Tropics), Puerto Rico's newest broadcasting station, aired its initial programs on October 18, 1947. First to be equipped with phasing antennae, it reaches beyond San Juan to Ponce, Mayaguez and the 75 other cities and towns where about 2,000,000 Puerto Ricans live and work. To them this Westinghouse equipped station brings news and a schedule of local and U.S.A. programs. Low-cost, trouble-free operation is the keynote of the 10 kw. A.M. transmitter. Westinghouse all-metal rectifiers and a complete supervisory indicating system make WIBS the last word in radio stations, affording its listeners countrywide and reliable radio transmission service.



COOL COMFORT

Notice how attractively the ceiling air outlet of this Westinghouse Unitaire air conditioner has been combined with fluorescent lighting. Together they give a modern look to any executive office. Cool, comfortable, attractive offices like this are business "musts" in every country today. That is why Westinghouse Unitaire equipment is so popular. Low-priced, factory-built, self-contained, they may be used with air ducted" in from nearby service rooms . . . or inexpensively installed as rich looking additions to office furniture. Westinghouse designs and manufactures equipment for every conceivable air conditioning need of homes, offices, factories, theatres, etc.

To obtain Westinghouse products or engineering service, contact your local distributor or Westinghouse Electric International Company, Room 1837, 40 Wall Street, New York 5, U.S.A.

NOW . . . SMALLER MOTORS

Two years ago, Westinghouse developed "copper-fin" motors. The fins remove heat from the interior of totally-enclosed motors in such a way that the motors can be built much smaller. The new type motors may now be specified for many uses where space requirements are limited.

TOWARD THE FUTURE

In a recent record-smashing test at Grand Coulee Dam in the U.S.A., this 84 inch diameter Westinghouse circuit breaker easily interrupted short circuits of 7½ million kva . . . all the energy that Grand Coulee and six other massive power projects could muster. As a result, Westinghouse engineers now have performance data which enables them to design and build circuit breakers capable of handling short circuits of 10,000,000 kva or over.

WESTINGHOUSE

First in Electrical Engineering and Manufacturing

Designed with a lifetime oil supply

They're Oilite products, of course.

That means they're self-lubricating! You see, Oilite powdered metal bearings and machine parts contain a sealed-in lifetime oil supply. Neglected oiling—responsible for so many part failures—is impossible.

You can adapt Oilite products to nearly every machine you use. They contain no graphite . . . will not stick or gum. They're corrosion-resistant . . . even in salt air or salt water. And they're ideal for hard-to-reach installations and places where excessive oil might damage your finished products.

You can get inexpensive Oilite bearings in hundreds of standard sizes. You can get cored and bar stock for emergency or maintenance replacement. Or you can have special parts designed by Oilite engineers. Write for details.

★ ★ ★

NOTICE TO DISTRIBUTORS: A few highly desirable and profitable territories are now open for Oilite products.

CHRYSLER EXPORT **OILITE**

DIVISION OF CHRYSLER CORPORATION
DETROIT 31, MICHIGAN

POWDERED METAL
PRODUCTS